

Centre for
Urban Research

Melbourne at 8 Million:
Matching Land Supply to
Dwelling Demand.

Michael Buxton
Joe Hurley
Kath Phelan

October 2015

Final Report



RMIT
UNIVERSITY

Centre for
Urban Research

MELBOURNE AT 8 MILLION: MATCHING LAND SUPPLY TO DWELLING DEMAND

Michael Buxton

Kath Phelan

Joe Hurley

RMIT University, October 2015

**MELBOURNE AT 8 MILLION: MATCHING
LAND SUPPLY TO DWELLING DEMAND**

Melbourne at 8 Million: Matching Land Supply to Dwelling Demand is a research project by researchers from the School of Global, Urban and Social Studies, RMIT University.

Funded by:

RMIT University Research and Innovation, RMIT Global Cities Research Institute, The Myer Foundation.

Copyright 2015

Michael Buxton, Kath Phelan, Joe Hurley.

Cover image: Luciano Pia

Published by RMIT University, Melbourne, 2015.

School of Global, Urban and Social Studies
RMIT University
City Campus
GPO Box 2476V
Melbourne, Victoria 3000
Australia

Citation details: Michael Buxton, Kath Phelan, Joe Hurley (2015) *Melbourne at 8 Million: Matching Land Supply to Dwelling Demand*, RMIT University.

ISBN: 978-0-9941890-4-2

Foreword

By 2051, the populations of Australia's capital cities are projected to double. Based on current trends and under existing policy settings, 72 per cent of Australia's future population will be located in these cities. But there is no national debate about the impacts of such continued population concentration, alternatives to it or the most appropriate models of urban form to enable enlarged cities to continue to function effectively. A collective sense of denial seems to afflict governments, policy makers and even interest groups on the best ways to accommodate such dramatically increased populations in our cities. Governments maintain neo-liberal governance systems which are clearly inadequate; government roles are reducing in importance at the same time that demand grows for cross-sectoral solutions to increasingly complex problems.

This report proposes one approach to preparing for a doubling of the population of Melbourne without assuming the desirability or otherwise of such an increase. It presents one scenario as a contribution to a necessary debate on where and how to meet future dwelling demand. The findings of the report challenge the conventional view accepted until recently that most demand should be met in expanding outer suburbs, a model of urban form based on detached housing on relatively large lots and separated uses. The reality of the new dwelling market in Melbourne is that high-rise apartments and outer urban housing limit the choices of large numbers of people to inadequate, poorly serviced housing types often far from employment. The location and most suitable types of housing should be intricately linked with the effective functioning of the city through access to employment and service provision, avoiding inequitable outcomes and increased social division, and protecting amenity and providing high quality urban design and environmental conditions.

Other recent and ongoing studies from the Centre for Urban Research, RMIT University, examine the potential for regional growth and limiting outer urban expansion in accommodating expected population growth. This report is concerned specifically with proposing a scenario which identifies how to match land supply to expected demand for dwellings. Yields are affected by assumptions about residential density and design which are applied to the scenario's identified land supply.

This report therefore is intended to contribute to a long overdue debate which will define the future of Melbourne.

The project was funded by a grant from Research and Innovation, and the Global Cities Research Institute, RMIT University, with additional funding from the Myer Foundation.

The project authors are:

Professor Michael Buxton, School of Global Urban and Social Studies, RMIT University
Dr Kath Phelan, Research Fellow, School of Global Urban and Social Studies, RMIT University
Dr Joe Hurley, Senior Lecturer, School of Global Urban and Social Studies, RMIT University

The authors gratefully acknowledge the assistance of:

Professor Sarah Bekessy, School of Global Urban and Social Studies, RMIT University

Dr Georgia Garrard, School of Global Urban and Social Studies, RMIT University

Simon Van Wijnen, School of Global Urban and Social Studies, RMIT University

Professor Mauro Baracco, School of Architecture and Design, RMIT University

Simon Micmacher, Department of Environment, Land, Water and Planning

Richard Watling, Department of Environment, Land, Water and Planning

Kieran Perkins, Department of Environment, Land, Water and Planning

Christabel McCarthy, City of Melbourne

Emma Appleton, Office of the Victorian Government Architect

List of figures

- Figure 1 Contribution to potential dwelling yield by lot type, zone or area, compared to *Plan Melbourne*..... 2
- Figure 2 Dwelling yields by zone and location 3
- Figure 3 Metropolitan regions..... 14
- Figure 4 Melbourne’s tram routes..... 16
- Figure 5 City of Whitehorse, all zones and all lots 17
- Figure 6 City of Whitehorse, lots without heritage overlays in zones appropriate for redevelopment 17
- Figure 7 Dwelling yield rules for lots under 2,000 square metres..... 19
- Figure 8 Take-up and dwelling development rates for selected zones and lot sizes by region 22
- Figure 9 Dwelling yields by *Plan Melbourne* regions 24
- Figure 10 Contribution to potential yield by various categories of lots types or areas 27
- Figure 11 Dwelling yields by zone and location..... 28
- Figure 12 Potential dwelling yield by zone and lot size 29
- Figure 13 Opportunities for infill redevelopment along tram routes..... 31
- Figure 14 Sydney Road application of Heritage value characteristic 32
- Figure 15 Middle region lots over 2,000 square metres..... 33
- Figure 16 City of Whitehorse lots over 2,000 square metres..... 34
- Figure 17 Proportion of municipalities’ residential areas zoned NRZ, GRZ and RGZ 38
- Figure 18 Proportion of municipalities’ total areas zoned NRZ, GRZ and RGZ..... 38

List of tables

- Table 1 Number of lots suitable for increased supply 16
- Table 2 Dwelling yield rules for sites under 2,000 square metres..... 19
- Table 3 Take-up rates for lots under 2,000sqm..... 20
- Table 4 Take-up rates for lots over 2,000sqm 20
- Table 5 Dwelling yields..... 23
- Table 6 Total dwelling yield..... 26

Table of contents

- Foreword i**
- List of figures..... iii**
- List of tables iv**
- Table of contents..... v**
- Executive summary..... 1**
 - Key findings 2
 - Implications 4
- Introduction 6**
 - Government focus on demand 6
 - Housing trends in Melbourne 8
 - Growth management..... 10
 - Modelling alternative housing intensification 10
- Methodology: a metropolitan wide housing supply model 13**
 - Supply Scenario 15
- Findings: housing supply potential in Melbourne 23**
 - Scenario dwelling yield and *Plan Melbourne* 23
 - Location 23
 - Contribution of zones in established suburbs..... 25
 - Protecting Heritage 30
 - Larger infill lots 32
- Discussion..... 35**
 - Policy implications..... 40
 - Detailed residential infill site investigation:..... 40
 - Residential zones: 41
 - Regulatory reform: Heritage Overlays and Precincts 42
 - Growth corridor development: 42
 - Regional development options:..... 42
 - Cross-sectoral impacts:..... 43
- Conclusion 44**
- References 45**

Appendix A: Scenario results 47
Appendix B: Estimates of future dwelling demand..... 50
Appendix C: Methodology step one – Lot Selection 56
Appendix D: Victoria’s planning schemes: zones and their schedules 66
Appendix E: Methodology step two – Calculating lot-level yield potential 68
Appendix F: Methodology step three – Applying take-up rates 79
Appendix G: Density measures 83
Appendix H: Other housing typology examples 85

Executive summary

Australian governments have avoided classifying land appropriate for development in cities and identifying the types of preferred residential housing for suitable sites. Instead, they have projected future demand for housing and relied on the private sector to find sources of supply to satisfy this anticipated demand. Metropolitan strategies have allocated proportions of future demand to sub-regions, such as inner, middle and outer urban areas, without demonstrating how to meet these spatial allocations. Australian governments will need to change this approach to governance and land supply to accommodate substantial population growth in cities.

This report demonstrates how Melbourne can double its population by 2051 through residential development largely within existing urban boundaries while preserving the existing historic urban fabric and maintaining lifestyle amenity. It presents a comprehensive metropolitan-wide model for determining potential land supply for housing in Melbourne.

The model allows development scenarios to be tested, comparing potential land supply with expected demand for new housing. A preferred scenario is presented that estimates the impact on housing supply of the following policy options:

- a reduced emphasis on high-rise housing in favour of medium-rise European urban form;
- strategic identification and development of larger sites;
- development within planning zones;
- excluding pre-1945 shopping strips with heritage value from development; and,
- reducing outer urban growth.

The scenario provides detailed land supply estimates, calculating the impacts of the new residential zones and the potential for redevelopment of commercial and mixed use zones to contribute to future housing needs. The scenario assumes the continuation of development on large suitable brownfield and other large redevelopment sites and a reduced contribution to dwelling supply in the growth corridors.

The model allows the calculation of potential dwelling supply based on a set of assumptions about yield potential and take-up rates which are informed by planning, zone, location, existing development characteristics and lot size. The scenario is based on existing regulations and protection of residential and neighbourhood amenity. The key details of the yield rules and take-up rates by planning zone are as follows.

- **Neighbourhood Residential Zone (NRZ)** excludes medium density; requires a lot size of 750 square metres before dual occupancy; and, only one half of lots between 750 and 2,000 square metres in the middle suburbs and one third in outer suburbs qualify for one additional or two new dwellings.
- **General Residential Zone (GRZ)** requires a lot size of 450 square metres before dual occupancy; only one third of lots between 450 and 1,000 square metres qualify for dual or triple occupancy; medium density is limited to lots between 1,000 and 2,000 square metres (average of eight dwellings) at a take-up rate of 60 per cent of lots in the middle suburbs and 30 per cent in the outer suburbs; GRZ lots over 2,000 square metres have the same take-up rates.

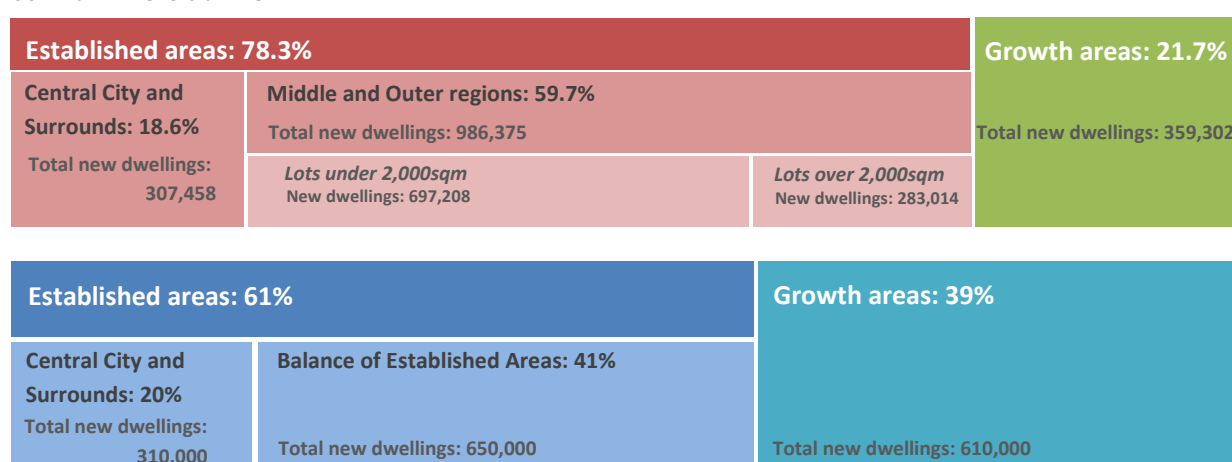
- **Residential Growth Zone (RGZ)** allows for more intensive apartment development and has a 100 per cent take-up rate across all suburbs.
- **Activity Centre (ACZ), Commercial 1 (C1Z) and Mixed use (MUZ) zones** allow up to 48 dwellings on lots under 2,000 square metres (in six storey buildings with four residential levels); take-up rates of 50 per cent in the middle suburbs and 30 per cent for outer suburbs apply.
- **Lots over 2,000 square metres** use a dwelling per hectare rule at 120 dwellings per hectare in inner areas, 70 dwellings in the middle suburbs and 35 dwellings in the outer suburbs.
- **Commercial 2 (C2Z) and Industrial (INZ)** zoned lots over 2,000 square metres have a 100 per cent take-up for inner suburban sites within 400 metres of an activity centre, 30 per cent for the middle suburbs and 20 per cent for the outer suburbs.

Key findings

Plan Melbourne, the 2014 strategic plan for the metropolitan area, projects that Melbourne will need an additional 1,570,000 dwellings by 2051. The scenario presented in this report shows that almost 80 per cent of this demand can be met within the established – or built up – city. It demonstrates that only about half of the *Plan Melbourne* growth projected for outer urban growth areas as a proportion of total dwelling growth is needed. It also demonstrates that projected dwelling growth can be met while protecting Melbourne’s remaining heritage buildings.

Figure 1 presents the distribution of dwelling supply across the metropolitan area under the scenario compared to that in *Plan Melbourne*.

Figure 1 Contribution to potential dwelling yield by lot type, zone or area, compared to *Plan Melbourne*



The scenario’s total projected dwelling yield from the Central City and Surrounds is 307,458 dwellings or 18.6 per cent of the total, compared to the figure of 310,000 dwellings projected in *Plan Melbourne*. The scenario presented demonstrates that a different approach to large brownfield sites, based on traditional European medium-rise

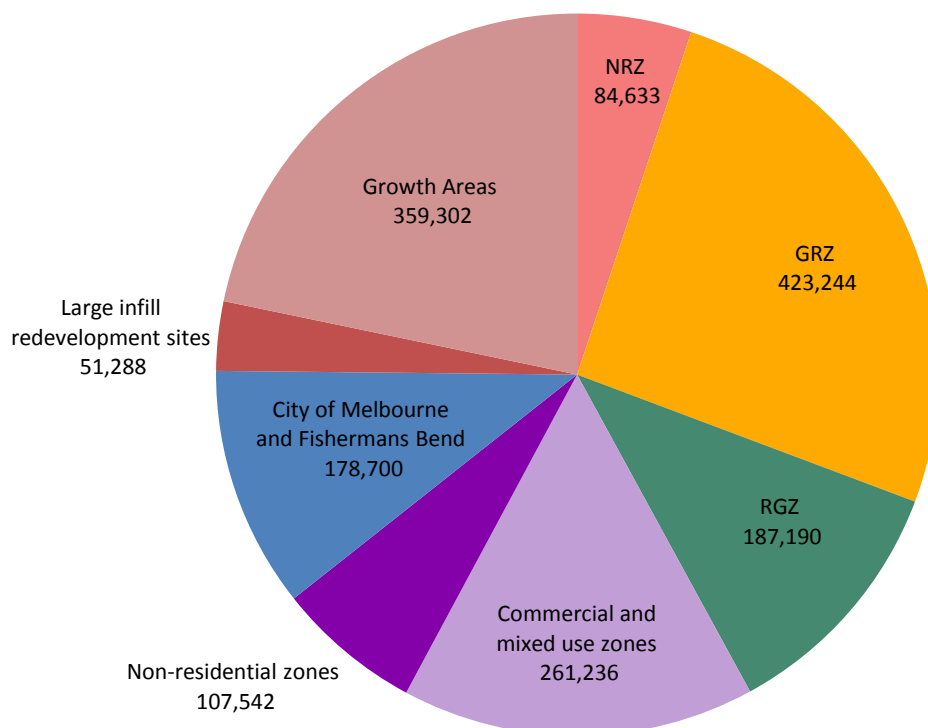
residential and mixed use development to six storeys, can potentially yield almost the same number of dwellings as the returns from high-rise towers.

The scenario finds most future dwelling supply is available in Melbourne’s Established Middle and Outer regions mainly on lots under 2,000 square metres. A total of 986,375 dwellings are estimated for all zones or 59.7 per cent of total supply compared to the *Plan Melbourne* target of 650,000 or 41 per cent of supply proposed in *Plan Melbourne*. Of this total, 697,208 dwellings could be built on existing lots below 2,000 square metres and 283,014 on lots 2,000 square metres and above. Most of this growth is projected for the General Residential Zone. The total estimated yield from this zone is five times greater than the yield from the most restrictive zone, the Neighbourhood Residential Zone, and double the yield from the most development-oriented zone, the Residential Growth Zone.

Finally, the scenario shows that the Growth Areas could accommodate 359,302 dwellings under this scenario or 21.7 per cent of the metropolitan total compared to the *Plan Melbourne* proportion of 39 per cent.

Across the metropolitan area the three residential zones could provide 695,733 total possible new dwellings (see Figure 2). The vast majority of this total is in the Established Middle and Outer regions, while the Inner region municipalities’ three main residential zones have potential for only 37,871 dwellings.

Figure 2 Dwelling yields by zone and location



The General Residential Zone has 61 per cent of the three residential zones’ development potential (423,244 additional dwellings). Three quarters of these are on lots under 2,000 square metres with the remainder on lots over 2,000 square metres.

The scenario finds that the Neighbourhood Residential Zone (NRZ) areas contain the potential for 84,633 additional dwellings, on one third of the area compared to the spatial extent of the GRZ. These dwellings would be evenly split between lots above and below 2,000 square metres

The Residential Growth Zone (RGZ) applies to one per cent of the total metropolitan area zoned residential yet has potential for 187,190 dwellings, the vast proportion – 181,212 – on lots under 2,000 square metres.

This pattern of potentially high yield from relatively small lots continues in the commercial and mixed use zones. The scenario demonstrates that these zones could potentially accommodate almost a third more dwellings – 261,236 – than the Residential Growth Zone. This potential yield is also greater than that from large inner urban brownfield sites in the City of Melbourne and Fishermans Bend (178,700). The other main non-residential zones, the Commercial 2 Zone and the Industrial Zone could potentially provide another 107,542 dwellings. These zones and larger sites in the central city have the potential for about half of the scenario's total yield.

Exclusion of all buildings with a heritage overlay and a building constructed before 1945 along tram corridors removes 208,688 dwellings from the scenario's total potential supply. Elimination along tram corridors of 36,230 dwellings from lots with heritage overlays and 15,843 from lots with buildings otherwise constructed before 1945 removes a total 52,073 from potential supply. This minor loss to land supply has makes a significant contribution to protecting Melbourne's built heritage.

In all the zones and regions, larger lots above 2,000 square metres are important residential, mixed use and non-residential redevelopment opportunities, possibly contributing around 22 per cent, or 359,014 additional new dwellings across the metropolitan area.

Implications

Melbourne has ample land with redevelopment potential within the urban growth boundary. The inner city and established suburbs have enough land to meet almost all of the dwelling requirements of a growing population. The large expanse of brownfield and former industrial land almost circling the CBD is a particular advantage. However, the assumptions governing the redevelopment of this land determine the yield and types of new housing.

The scenario presented in this report demonstrates that the demand for new homes in Melbourne by 2051 can be met while retaining historic CBD, housing and retail areas, and high amenity suburban housing in the NRZ and limiting redevelopment on lots under 1,000 square metres in the GRZ. The new residential zones do not unduly constrain the ability of the supply of new dwellings to meet overall metropolitan housing demand. The area covered by the NRZ as a proportion of municipalities' total areas is small when compared with the zone's proportion of all residential zoned areas. The NRZ applies only to about 12 per cent of all zoned land: development limitations in this zone lead to minor impacts on land supply because of the GRZ's large spatial distribution and the extensive potential of non-residential land for residential redevelopment.

Non-residential zones offer extensive redevelopment possibilities, particularly the Commercial 1 Zone (C1Z) and in conversions from industrial land. The Mixed Use Zone (MUZ) currently allows significant development particularly in inner suburbs because of the lack of regulatory control. Activity centres affected by these zones are vulnerable to rapid transformation to medium and high-rise residential development either through demolition or façade development. Protecting all pre-1945 buildings in residential and C1Z, Activity Centre Zone (ACZ) and MUZ zones along tram routes from development would not significantly constrain metropolitan land supply. This demonstrates that large heritage and amenity benefits result in a small overall loss of potential metropolitan dwelling supply.

The proportion of outer urban growth corridor housing could be reduced by slightly increasing densities without unduly affecting metropolitan dwelling supply requirements. Increased average residential densities in Growth Areas could save significant amounts of land while yielding the same dwelling supplies, or allow the long term supply of growth corridor land to be extended. The planned concentration of high amenity, diverse housing options within the established city could contribute to reducing the need for outer urban development to proportions at or below the scenario's proposed 22 per cent.

No Victorian government has undertaken the required spatial and infrastructure planning for a Melbourne of eight million people. Strong state government leadership will be required to successfully accommodate such an increased population. Clear roles should be delineated for state and local government. A strategic plan is needed which all political parties, levels of government, business, community and other interest groups accept. This plan should be progressively implemented over a long time period through integrated statutory, funding and other mechanisms based around the principles of a high amenity, productive, functional and socially equitable city. For example, Melbourne's remaining buildings of heritage value will be progressively demolished without the introduction of height controls in commercial and mixed use zones, and the integration of more extensive legislative heritage protection under an expanded Heritage Act. The alternative is incremental poorly-designed high-rise inadequately matched to housing needs, substantial ad-hoc medium density development in residential areas, and some of the world's worst outer urban subdivision design inadequately served by public transport and other services. At this critical phase in Melbourne's development, the alternatives are clear: integrated long term planning or an increasingly socially divided and dysfunctional city.

This report should serve as the basis for more detailed state and local government investigation of suitable redevelopment sites and the development of design and development rules in accommodating future dwelling demand. Land supply is intricately connected with transport, amenity, infrastructure, social and environmental factors. Consideration of complex relationships between such factors and anticipation of new demands will require more interventionist and cross-sectoral government policy. Such policy considerations should include the potential for regional population and infrastructure policy linked to land use as an alternative to the conventional location of most Victoria's population in the Melbourne metropolis.

Introduction

Australian cities are ill-prepared for the projected increase in the national population of 23 million people in 2013 to 46 million in 2056. Australia is one of the world's most urbanised countries, with two thirds of the population living in the five largest capital cities and three quarters in 18 urban centres over 100,000 people (Department of Infrastructure and Transport, 2013). Urban development will be further intensified with 72 per cent of growth expected in capital cities (ABS, 2014b). Under current metropolitan strategies, between 60 and 70 per cent of these increases will be located within the boundaries of established urban areas, raising urban consolidation to new levels.

The impacts of such a population increase and its concentration in existing capital cities is still little debated. Similarly, almost no national debate occurs about where to locate the necessary dwellings, desirable models of urban form, relationships with required infrastructure or systems of governance. Most governments are not examining alternatives to the growth of capital cities such as the development of regional centres. No Australian national cities policy has existed for 40 years. Regional planning has been practiced rarely in Australia. The population in some states, such as Queensland, is more decentralised than others and various regional structures operate more successfully in some, such as Western Australia, than others. But Australia lags far behind the best practice regional land use policies integrated with fast and effective public transport infrastructure common in many European countries. Currently, only 15 per cent of the Australian population live in medium-sized cities with populations from 100,000 to one million (Commonwealth of Australia, 2013). Network city planning integrating urban centres of various scales through modern rail systems are conspicuously absent. The dominance of neo-liberal planning systems has eroded successful regional planning on the fringes of Melbourne in the 1970s, and cross-sectoral policy implementation of the 1980s and early 1990s. Melbourne with a population of eight million will operate in radically different ways than a city of four million and will experience non-linear impacts. Yet planning continues as if impacts will be linear and predictable. We have wasted twenty five years, failing to anticipate or prepare adequately for impending radical exponential change.

Government focus on demand

Victorian governments have made some limited attempts to identify the supply of land available in cities, such as through the government's Urban Development Program. But generally, over the past two decades governments have tended to avoid the task of classifying land appropriate for development in cities and the types of preferred residential housing for suitable sites. Instead, governments have projected future demand for housing and relied on the private sector to find sources of supply to satisfy this anticipated demand. Metropolitan strategies have allocated proportions of future demand to sub-regions, such as inner, middle and outer urban areas, without demonstrating how to meet these spatial distributions. In the absence of implementation strategies, such proportions have little value in shaping the location and nature of supply. In Melbourne, for example, *Melbourne 2030's* 2002 strategic objective of 31 per cent outer urban growth and 69 per cent established area growth had changed by 2008 to an actual 48:52 split. The 2014 strategy *Plan Melbourne* fared little better with its objective of a 40:60 division remote from the reality of the 28:72 split the year after the strategy was adopted (ABS, 2015).

Australian governments continue to develop planning policy and systems which reduce the role of government in determining the nature of metropolitan growth, preferring facilitative planning systems with the private sector driving selection of building sites, building types and densities. The 2012 Victorian Metropolitan Strategy Discussion Paper, for example, stated that “The Metropolitan Planning Strategy must move away from regulation as the primary means of achieving planning outcomes” (Ministerial Advisory Committee, 2012, p.viii). This reliance on market decision-making is leading to dwelling supply that is mismatched to housing needs and to a range of other undesirable consequences including: overdevelopment of inner city sites; development in inappropriate locations in established suburbs; further erosion of built form heritage; continued low density expansion on the fringe; failure to provide adequate infrastructure and services to new population centres; and under-development of some strategic sites.

Australian governments will need to change this approach to governance and land supply to avoid such consequences as cities double in size. The management of a population increase in Melbourne from four to eight million people is a challenging task. Associated problems will not simply increase in a linear fashion but exponentially, or in non-linear ways. Melbourne’s nineteenth and early twentieth century infrastructure served the city well until 1990 when the population reached 3 million people. Now the city has entered an unprecedented situation which challenges all existing systems. Identifying available supplies of land suitable for housing and requiring diverse dwelling types for a city of eight million people will require active government policy formulation for land use and development.

Doubling the population of Melbourne will bring serious and potentially detrimental challenges to the city’s liveability. Melbourne’s historic buildings and neighbourhoods and its high amenity attributes contribute to the identity, health, environmental quality and the enjoyment of citizens but also provide significant economic benefits to the city. However, under current trends and a market-oriented system of governance, much of this amenity will be lost in business-as-usual growth to 2051. Already the provision of services and infrastructure to new outer urban suburbs and intensified housing areas in the existing city lags below adequate levels. Denser urban areas are not provided with increased open space to cater for increased populations.

This report presents a comprehensive metropolitan-wide method and model for determining potential land supply for housing in Melbourne. It shows that Melbourne has sufficient land supplies within its existing urban boundaries to more than cater for growth to a city of eight million people – and without demolishing key parts of the existing urban fabric. It demonstrates how Melbourne can double its population by 2051 primarily within existing urban growth boundaries while preserving existing historic and lifestyle amenity.

The model allows development scenarios to be tested, comparing potential land supply with expected demand for new housing. A preferred scenario is presented that estimates the impact on housing supply of the following policy options:

- a reduced emphasis on the current dominant inner city high-rise housing model on nominated large brownfield sites in favour of a traditional European urban form;
- strategic identification and development of large sites;
- redevelopment within planning zones;

- the impact of excluding pre-1945 shopping strips with heritage value from development; and,
- the potential for reducing outer urban growth.

The scenario provides detailed land supply estimates, calculating the impacts of the residential zones and the potential for redevelopment of commercial and mixed use zones to contribute to future housing needs.

Developing and using a supply model in this way allows testing of different policy scenarios. It can also bring confidence to a more defined and interventionist role for government that delivers improved economic, social and environmental outcomes while maintaining dwelling supply in Australian cities.

Housing trends in Melbourne

Melbourne is home to nearly three-quarters of the state's population and between 2006 and 2011 the city's population grew on average 1.9 per cent each year. By 2051 its population will have increased to eight million people at double the growth rate of the previous 40 years. At this pace, Melbourne will overtake Sydney as Australia's largest city by 2053 (ABS, 2015; DTPLI, 2014). Melbourne already has added over one million new residents since the start of the millennium.

Melbourne is growing upward in new high-rise areas while also expanding extensively outward. The metropolitan area has quadrupled over the last 40 years to cover almost 10,000 km² at some of the lowest densities in the world. While every metropolitan municipality grew between 2003 and 2013, growth has been greatest in the six growth area municipalities: Wyndham, Casey, Melton, Whittlesea, Hume and Cardinia accounted for 362,719 or 49 per cent of all new dwellings built during this period. Over the same ten years, the four inner municipalities of Melbourne, Port Phillip, Yarra and Stonnington added 94,455 dwellings, an increase of 13 per cent. The 13 Middle region councils added 179,090 dwellings, growing by 24 per cent, and the eight Established Outer municipalities added 104,580 dwellings, an increase of 14 per cent. However, the long dominance of the growth corridors appears for the present to have come to an end. The number of new dwellings in Growth Area municipalities fell from 18,000 dwellings in 2009-10 to 12,000 in 2012-13 or from 48 to 28 per cent of new dwellings (ABS, 2015).

This move from fringe growth to consolidation began when housing preferences shifted towards medium density housing in the 1990s. The Victorian state government's introduction of medium density residential codes in various forms helped facilitate a boom in multi-unit housing. Multi-unit approvals rose from 1,704 in 1990-91 to 12,362 in 2002-03, a seven-fold increase, while new detached housing commencements in 2003 were the same as in the late 1980s, at around 23,000 a year (ABS, 2015).

In recent years medium and high-rise development have brought significant intensification and population growth to Melbourne. The municipality of Melbourne, covering the CBD and some adjoining areas, grew faster than any other Australian municipality in the year to June 2013 with a population increase of 11,029. The CBD population rose 22.7 per cent to 29,000 while Docklands and Southbank each grew by 15 per cent (ABS 2014a).

Across the metropolis, in the first half of 2013-14, high-rise approvals reached a record annualised value of \$4.8 billion, up from \$3.5 billion two years earlier. New high-rise development is concentrated in the City of Melbourne, with almost \$1.3 billion worth of annualised building approvals in the first half of 2013-14. Such investment is now spreading to the City of Yarra where annualised apartment approvals' value rose 255 per cent to \$491 million in the first half of 2013-14, up from \$138 million the previous year. The value of apartment development in the middle ring suburbs of Toorak, South Yarra, Kooyong and Armadale has reached \$500 million annually while the Cities of Port Phillip and Moonee Valley also attract significant investment (ABS, 2014; Millar et al., 2014). Ten years ago, no one predicted the scale of this trend.

Plan Melbourne proposes that an additional 1,570,000 new dwellings will need to be built in Melbourne by 2051, consisting of 310,000 for the Central city and surrounds, 650,000 for established suburbs and 610,000, or 38 per cent, in Growth Areas (DTPLI 2014). How this demand will be met, and the pressures that satisfying it will place on the amenity, functioning, productive capacity and social cohesion of the city are key issues confronting the city today.

Plan Melbourne proposes large-scale urban renewal for a series of large sites surrounding the city: Fishermans Bend, City North, E-Gate, Arden-Macaulay, Dynon Rd corridor and the Flinders Street Station to Richmond Station corridor. These complement existing sites at Southbank, Docklands and the CBD. It also identifies a range of strategic areas for redevelopment across the metropolitan region, including the national employment clusters at Parkville, Monash, Dandenong South, La Trobe, Sunshine and East Werribee; the nine metropolitan activity centres; industrial and health-education precincts; transport 'gateways' (ports and airports); and 29 potential urban renewal precincts and sites close to heavy rail. In the background are the remaining 114 former principal and major activity centres and all 900 neighbourhood centres of *Melbourne 2030*.

As individuals raised in established suburbs begin to form new households, they are likely to create further demand for medium density suburban redevelopment. One predicted consequence of facilitating market-based construction of both large amounts of high-rise apartments and detached outer urban housing is the failure to provide diverse dwelling options in established suburbs, including medium density housing. Birrell et al. (2012) argue that the 241,111 new households aged 25 to 34 which will form from 2011 to 2021 are unlikely to wish to settle permanently in small high-priced medium to high-rise apartments because they will wish to form families by their middle forties. The Grattan Institute (2011) also found that family households prioritise the number of bedrooms and living spaces over other housing variables, including dwelling type. Equally however, housing on the urban fringe may become increasingly unattractive to these new households as distances to jobs and services grow. Location may become as or more important than house size for this group (Kelly and Donegan, 2015).

While the shift to apartments and townhouses in established areas has started, improved planning is needed to ensure an increased range of housing options to 2051, particularly for this growing demographic cohort. Further, *Plan Melbourne's* predicted number of dwellings likely to be needed in established suburbs is not accompanied by any detail on how, where or at what densities such supply could and should be achieved or indeed whether increased supply in these regions might be achievable and more desirable than high-rise development and fringe expansion.

Growth management

The reformed land-use zones are the main vehicle for delivering more development in the existing suburbs (Buxton and Goodman, 2014). However, the Victorian state government has provided no detail on the potential of the zones to deliver dwellings through housing types and locations. Some commentators have expressed concern that the estimate of 650,000 new established area dwellings cannot be met because of regulatory restrictions imposed by new residential zones, leaving only small inner urban high-rise apartments or outer urban housing to meet demand. Supporters of urban intensification have criticised the extensive use of the most restrictive zone, the Neighbourhood Residential Zone (NRZ), which prevents the construction of medium density housing by limiting development to one additional dwelling or the number listed in a planning scheme schedule. The General Residential Zone (GRZ) allows medium density development to occur to a height specified in a schedule or provided in planning schemes' clause 54 or 55 (ResCode), while the Residential Growth Zone (RGZ) allows medium-rise development to 13.5 metres or the number in a schedule. The Property Council (2013:1) commented that "the restrictive components of the new zoning arrangements will no doubt please local activists who would like to freeze dry Glen Eira, but they effectively torpedo numerous local revitalisation opportunities and lock out higher level investment". Kelly and Donegan (2013:20) similarly claimed that "if this pattern of councils locking down most of their neighbourhoods continues, nearly all new housing will be built in Melbourne's outer suburbs and on the urban fringe".

However, such claims have been made without any detailed assessment of the impacts of new planning zones on possible supply. Potential for suburban redevelopment should be assessed against total land supply in all zones, not only the area affected by the Neighbourhood Residential Zone. Considerable redevelopment opportunities exist in suburban areas in commercial zones, small and larger infill sites, around activity and nominated redevelopment centres, along transport corridors and in other residential zones.

The lack of analysis of the implications of the new zones highlights a failing of the Victorian state government's strategic planning process: the government developed the new zones well in advance of the development of *Plan Melbourne*. The uses and developments which the zones allow and prevent, not *Plan Melbourne*, in effect constitute much of the real strategy for Melbourne. Further, *Plan Melbourne* does not attempt to match housing projections in nominated locations with potential supply, and as a result, its effectiveness in relating supply to projected demand will be limited.

Modelling alternative housing intensification

Some recent analyses have examined options for increased dwelling supply in existing urban areas. All advocate large scale redevelopment and imply a strong role for government in identifying sources of land supply and design criteria. One approach, *Transforming Australian Cities*, proposes redeveloping 6,693 hectares along inner city transport arterials, or three per cent of metropolitan land, which could house 1,003,950 people at 180 people per hectare or 2,476,000 people at 400 persons per hectare (Adams, 2010). In targeting transport corridors, this approach argues that Melbourne's suburbs would become areas of stability with little need for development behind arterial roads, the urban growth boundary would not need to expand and some affordable housing would be built. This proposal has been challenged by the Department of Transport (2009), which

modelled the implications of different urban forms on transport energy use and greenhouse gas emissions. The more effective approach, it argued, is to direct development towards a small number of major transport nodes ('activity centres') rather than distribute it along major transport corridors.

Woodcock and Dovey (2010) modelled ways to achieve the *Melbourne 2030* proposal to build 255,000 new dwellings in activity centres over three decades, doubling the 1990's rate of infill. They identified 6,300 hectares of developable land in activity centres or adjacent to tram, rail and bus routes with a potential to accommodate 600,000 new dwellings at densities of 100 to 250 people per hectare. Land in activity centres comprised 57 per cent of the total. This is a similar approach taken to that of the earlier Victorian government *Urban Villages Strategy* which suggested that an additional 750,000 people could be accommodated in about 900 activity nodes across the city (Energy Victoria et al., 1996).

Other studies, such as the investigation of the potential of older middle ring 'Greyfields' housing (Newton et al., 2011), have highlighted large scale, higher density redevelopment potential in established areas through replacing extensive tracts of existing low density detached housing. Melbourne's 'greyfields' suburbs are defined as the "ageing, occupied residential tracts of suburbs which are physically, technologically and environmentally obsolescent" (Newton et.al, 2010: 81). At the local level, some municipal councils such as the City of Darebin have identified infill sites and modelled development options to illustrate their capacity for significant infill (City of Darebin, 2015: 86-88).

At a larger scale, the Victorian state government engaged SGS Economics and Planning (SGS) to develop a sophisticated housing capacity model for Melbourne's established areas. The model defined lots available for future housing development under the former planning zones; it excluded various planning zones, small lots and those contained in Owners Corporations, and included lots identified in councils' strategic planning work and the Urban Development Program. Using planning scheme requirements and recent development trends (including costs and prices) for local areas, the model then distributed *Victoria in Future 2008* projected dwelling demand for mesh blocks in five year increments. This distribution was also informed by drivers of local density which took into account transport connectivity, the age and density of surrounding built form and individual site configuration (as this influences the potential density of development). It also considered household characteristics, including historical housing preferences. Municipalities have used the capacity assessments as background information and a useful methodology for informing housing strategies (often required as part of implementing the new residential zones) (DPCD, 2011; SGS, 2011).

These contributions have helped demonstrate that, under reformed policy and regulatory settings, significant potential exists for increased dwelling supply in established urban areas. However, some factors in these studies limit confidence in the options they canvass for policy change. The Transit Corridor proposal focuses a significant portion of redevelopment in areas of high heritage value; if fully realised, one of the largest losses of heritage buildings could occur in a short time frame in Melbourne's history. While the few buildings on the Heritage Register would be protected, half the buildings protected by the Heritage Overlay would be redeveloped, representing a substantial loss. In addition, history suggests that once 'big city' redevelopment commences, initial preservation considerations are ignored. The Activity Centre proposal by Woodcock and Dovey exclude

buildings protected by heritage overlays, but many activity centre structure plans do not protect the heritage of some of Melbourne's most important nineteenth century streetscapes because of the inadequate use of heritage studies and relevant overlays such as the Heritage and Design and Development Overlays. The Greyfields assumption that substantial amounts of housing in established suburbs is obsolete and in poor condition is questionable.

The Transit Corridor proposal would lead to major pressure on tram services and extensive cross town car use, and the Greyfields proposal to further extensive car use. Many potential social benefits are spatially located: for example, redeveloping transit routes would disadvantage, comparatively, jobs and services in dispersed suburban areas by further concentrating inner urban opportunities. However, the singular focus of these contributions is the most significant limitation for informing policy change. None, with the partial exception of the SGS study, take a metropolitan-wide approach and they do not consider a range of options or combinations to enable evaluation of the marginal costs and benefits of different urban forms (Groenhart and Buxton, 2011).

The transit corridor element of this report differs from the Adams (2010) study as it defines many more lots as ineligible, particularly by excluding bus routes, all sites with heritage value and lots with more than one dwelling. As a result, this report only includes three per cent of the Adams (2010) study's total lots and 26 per cent of its tram route lots. This report's scenario calculates about 28 per cent of the Adams study's yield at 180 people per hectare along tram routes and 11 per cent at 400 people per hectare. It finds only six per cent and two per cent respectively of the Adams study's combined bus and tram dwelling estimates.

Methodology: a metropolitan wide housing supply model

Land use modelling for urban growth attempts to represent the spatial interactions between elements of a functioning urban system, such as a city. Modelling traditionally has been used to attempt to forecast urban development trends (Wegener, 1994). The increasing complexity of interactions between urban elements in functional systems as cities increase in size has turned attention from the difficulties of prediction towards scenario development. A scenario can be defined as a story involving an internally consistent and plausible explanation of how events unfold over time (Swart et al, 2004). Scenarios generally are not regarded as predictions but as normative subjective narratives which explore plausible futures. A preferred scenario therefore can be developed for an urban system which allocates anticipated dwelling growth to geographical areas to estimate the probability of development. This allocation is based on factors such as the availability of land types and zoning, and can be related to other elements such as the location of retailing and employment, and services and infrastructure provision. Pettit et al (2013) describe such an approach to urban growth modelling as rule-based allocation.

This report has built a comprehensive housing supply model for an entire metropolitan region. The model allows different supply scenarios to be tested, and is used to identify potential land and dwelling supplies to 2051, when *Plan Melbourne* projects that the metropolitan area will require an additional 1,570,000 homes. The model calculates potential for housing supply across the city by identifying sites suitable for development and applying appropriate yields to those sites under different built form guidelines or restrictions. The model is based on existing patterns of land use. While some land assembly may occur and thus enable greater yield, models based on assuming land assembly disregard evidence on the challenges of achieving such lot amalgamation (Eckhart 1985; Groenhart et al., 2013; Nygaard and Meen, 2013).

The model uses the Victorian state government's *Housing Capacity Assessment* (2004-2012, HCA) data set which is based on Melbourne's cadastre. A set of lot characteristics is used to assess development potential for every lot in metropolitan Melbourne. The key lot characteristics used are: Lot Size; Planning Zone; Region, Existing Dwelling Number; and Heritage Value. Lot Size is recorded in square metres and provides the basis for potential dwelling yield calculations. The Planning Zone provides the detail of the land use policy provisions for the lot, and thus the nature of future permitted development. The Region provides information about the location of the lot within the metropolitan area which informs the intensity of appropriate development. Lots are coded as Expanded Central City, Inner, Established Middle, Established Outer or Growth Area (see Figure 3). The Existing Dwelling Number indicates development potential for increased housing supply: lots are coded as having no dwelling, one dwelling or more than one dwelling. Finally, the Heritage Value indicates lots with particular characteristics worth preserving.

Supply Scenario

The following scenario tests the potential for dwelling supply across the metropolitan region, and compares this supply to *Plan Melbourne's* dwelling projections. This scenario is based on a set of assumptions with the following policy principles:

- Support for higher density development, appropriate to local context;
- Protection of built form heritage; and,
- Minimising development on the fringe.

The assumptions detailed below can be changed to reflect different principles or objectives to allow evaluation of different policy scenarios. The remainder of this section describes in detail how this report's scenario is defined.

The scenario uses existing projected dwelling figures for specific parts of the metropolitan area where robust estimates are available. The model largely accepts the City of Melbourne and Victorian state government's estimated dwelling supplies in the *Plan Melbourne*-defined Expanded Central City area (see Appendix B: Estimates of future dwelling demand). The model also incorporates the Metropolitan Planning Authority's (MPA) projections for new dwellings within Precinct Structure Plans (PSP).

The three steps of Lot Selection; Lot-level Yield Potential; and Take-up Rate are shown below.

1. Lot Selection

Lots are filtered to identify those worth considering for redevelopment potential. All lots with features of interest (such as Community spaces; Churches; Courts; Prisons; Education facilities; Hospitals; and Recreation reserves and facilities) are excluded.

Lots with zones that preclude residential development are generally excluded. However, since supply is modelled over 40 years, some Commercial 2 (C2Z) and Industrial zoned (INZ) lots may be rezoned to allow residential development. These additional zones are restricted to lots in the Inner region within 400 metres of a designated activity centre (a strategic policy designation of areas suitable for intensified residential development) and to limited parts of the established suburbs.

The Lot Size characteristic is used to exclude lots under 225 square metres as generally inappropriate and impractical for redevelopment.

Lots with more than one dwelling are deemed to have already experienced consolidation, and are excluded.

All lots with heritage value are excluded. In this scenario, the heritage parameters are defined as lots under a Heritage Overlay and/or those lots with buildings developed prior to 1945 on tram corridors. This second constraint is an example of how the model can be adjusted to elevate particular policy objectives, in this case to preserve heritage strip shopping centres. Figure 4 illustrates the spatial distribution of lots along tram lines with Heritage Overlays or buildings developed prior to 1945, and the lots which remain available for potential redevelopment.

If not already included in the remaining lots, lots identified in the Victorian state government’s Urban Development Program (UDP) are added.

Table 1 presents the total number of lots in the dataset and those after the above exclusions. To demonstrate the impact of lot selection, Figure 5 and Figure 6 show the lots and zones for the City of Whitehorse before (Figure 5) and after (Figure 6) lot selection.

Figure 4 Melbourne’s tram routes

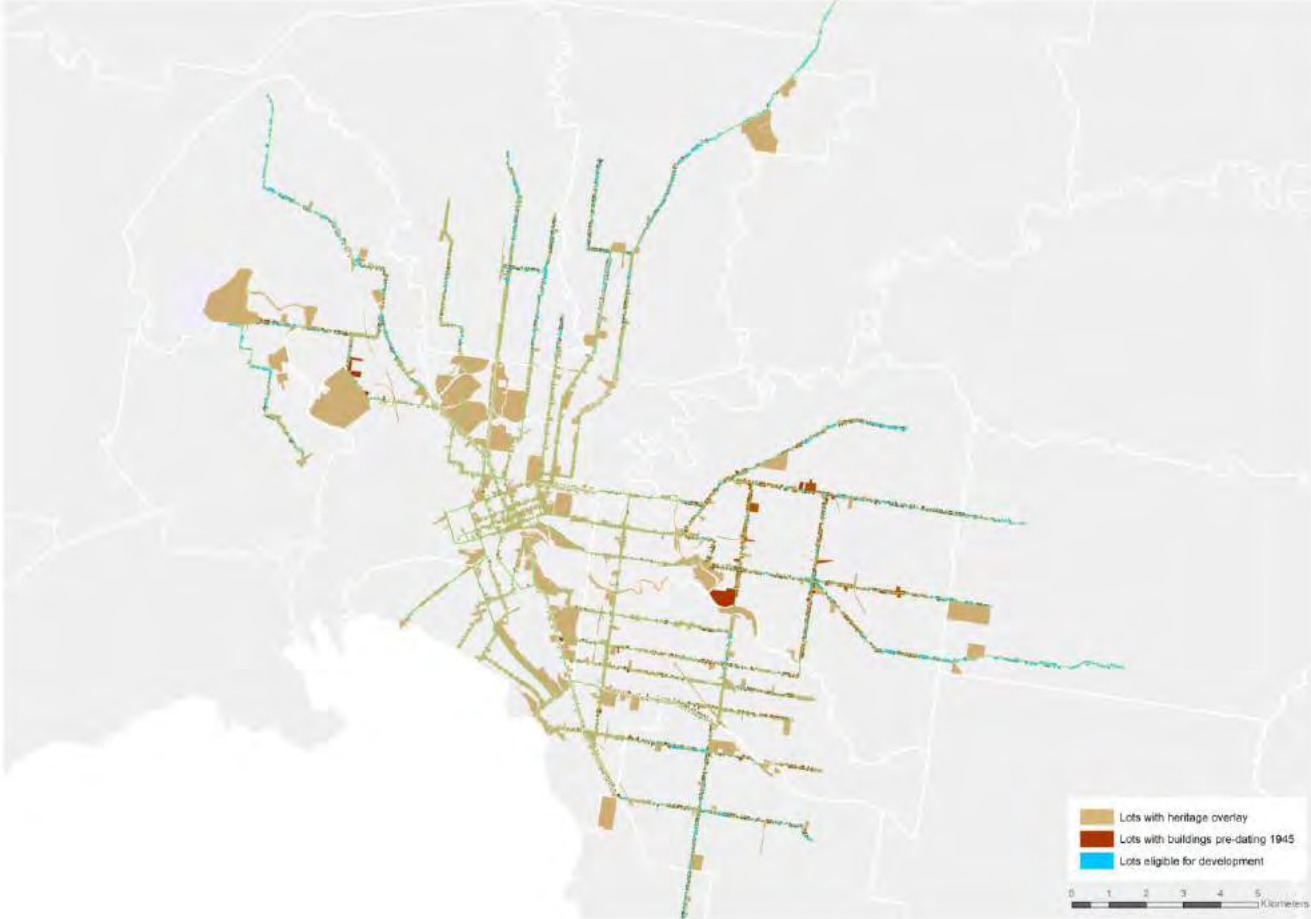


Table 1 Number of lots suitable for increased supply

Metropolitan region	Total number of lots in HCA data set	Lots after Lot Selection and Heritage Value Characteristics
Inner	108,559	22,985
Established Middle	637,571	283,949
Established Outer	473,103	266,056
Growth areas	343,288	662

Figure 5 City of Whitehorse, all zones and all lots

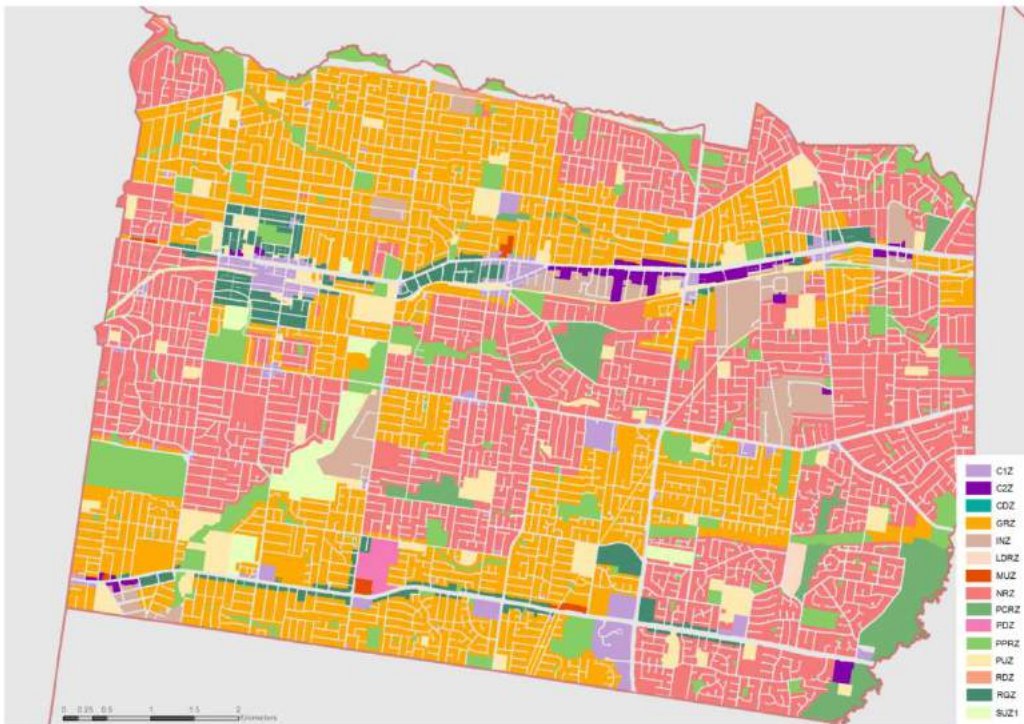
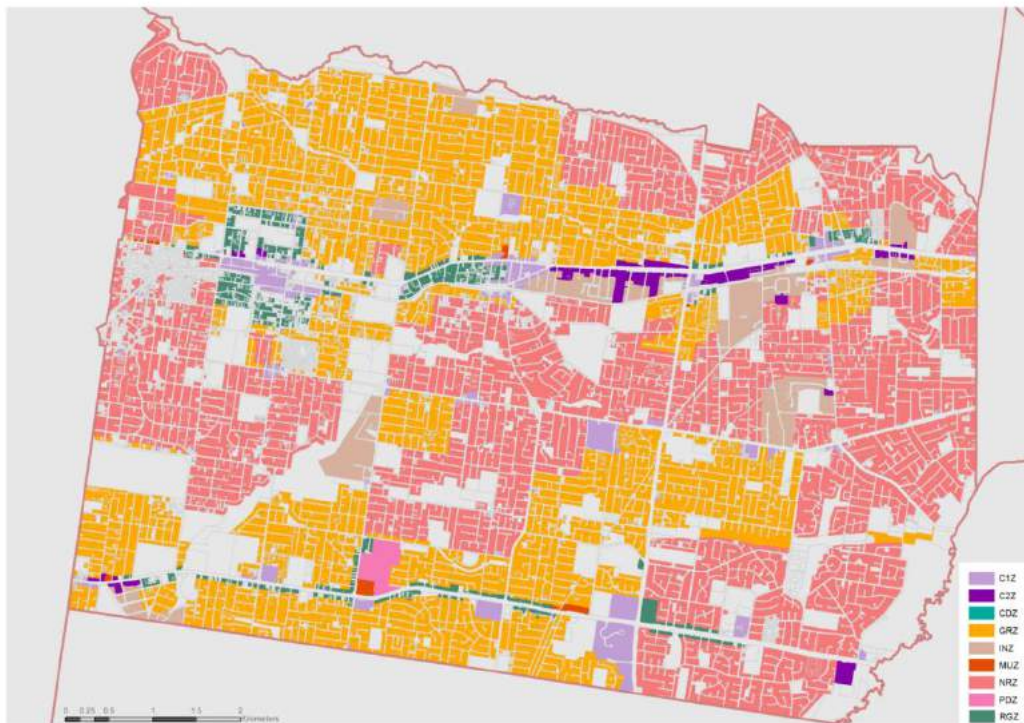


Figure 6 City of Whitehorse, lots without heritage overlays in zones appropriate for redevelopment



2. Lot-level Yield Potential

The yield rules aim to provide new supply appropriate to neighbourhood character. Table 2 and Figure 7 present the yield rules used in this scenario by lot size (up to 2,000 square

metres), zone and existing dwelling numbers for the Inner, Established Middle and Established Outer regions.

For the residential zones, the Victoria Planning Provisions (VPP) are used to broadly define lot yield rules and heights. For mixed use and commercial zones, the VPPs have few restrictions on built form. In these zones, the model sets height limits at six storeys, despite the discretionary approach of the existing provisions to the number of allowable storeys. This deliberately reflects a European built form. Yield rules also incorporate a Building Intensity Factor which considers site coverage (80 per cent or 60 per cent depending on zone) building setbacks and podiums, shared or private open space, and apartment size of an average of 80 square metres.

Yield rules for the Neighbourhood Residential Zone only allow two dwellings if a lot between 500 and 2,000 square metres is vacant. Lots which are 750 to 2,000 square metres could have one additional dwelling.

The General Residential Zone is limited to one dwelling on lots between 225 and 450 square metres. Dual occupancies require 450 to 675 square metres and triple occupancies 675 to 1,000 square metres. An existing dwelling on a lot between 1,000 and 2,000 square metres is expected to be demolished and replaced with eight new townhouses. Vacant lots between 1,000 and 2,000 square metres could also have eight new dwellings.

Four storey apartment buildings are well-suited to the Residential Growth Zone: lots between 225 and 500 square metres yield eight units; those between 500 and 1,000 square metres can accommodate 18; and the 1,000 to 2,000 square metre lots can have 36 apartments (with all yields representing an average across lots in the zone).

Activity Centre, Commercial 1 and Mixed Use Zone lots have higher expected yields in four residential storeys due to their locations: the smallest lots are assumed to have 11 units; lots between 500 and 1,000 square metres have 24 apartments; and those between 1,000 and 2,000 square metres could have 48 new dwellings (again, yields representing averages across the zones). Table 2 documents yield rules by zone for lots under 2,000 square metres.

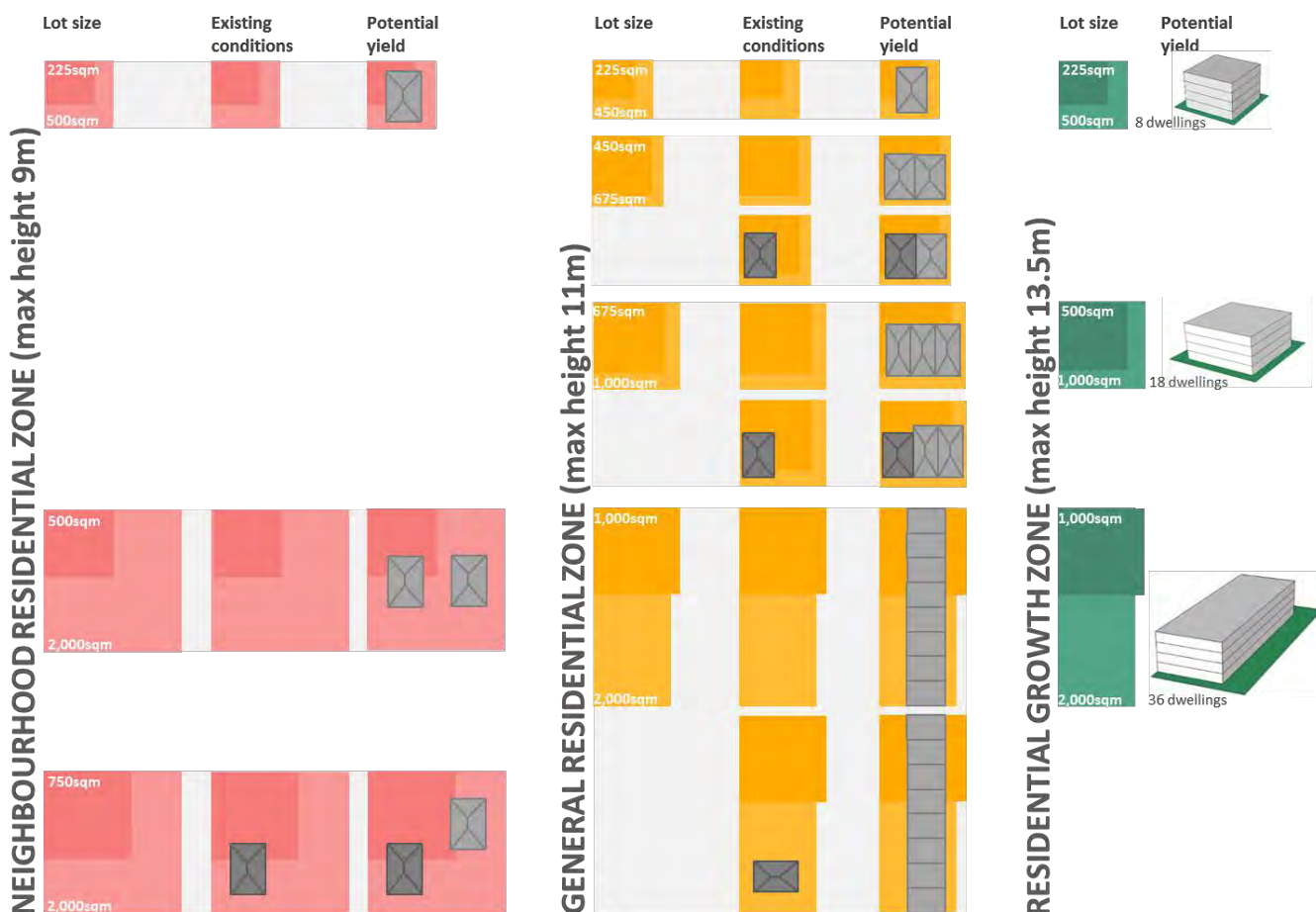
Lots over 2,000 square metres are treated differently due to their size, with a dwelling per hectare factor used based on regional location as follows: Inner, 120 dwellings per hectare; Middle, 70 dwellings per hectare; and Outer, 35 dwellings per hectare (see Appendix E: Methodology step two – Calculating lot-level yield potential, for further detail on deriving these rates). These are gross residential densities: see Appendix G: Density measures for a discussion of site, net and gross densities.

All lots in Growth Areas use either existing documented yields from the Metropolitan Planning Authority (via the Precinct Structure Plan process) or a dwelling per hectare factor of 15 dwellings per hectare on vacant Urban Growth Zone lots over 500 square metres.

Table 2 Dwelling yield rules for sites under 2,000 square metres

	YIELD RULES	
	No dwelling	One existing dwelling
Neighbourhood Residential Zone (NRZ)		
NRZ 225-500sqm	1	0
NRZ 500-2,000	2	0
NRZ 750-2,000	n/a	1
General Residential Zone (GRZ)		
GRZ 225-450sqm	1	0
GRZ 450-675	2	1
GRZ 675-1,000	3	2
GRZ 1,000-2,000	8	8
Residential Growth Zone (RGZ)		
RGZ 225-500sqm	8	8
RGZ 500-1,000	18	18
RGZ 1,000-2,000	36	36
Mixed use and commercial zones		
ACZ, C1Z, MUZ 225-500sqm	11	11
ACZ, C1Z, MUZ 500-1,000	24	24
ACZ, C1Z, MUZ 1,000-2,000	48	48

Figure 7 Dwelling yield rules for lots under 2,000 square metres



3. Take-up Rate

The final step is assigning take-up rates to reflect the proportion of suitable sites that might be expected to be redeveloped by 2051 under supportive policy conditions. For lots under 2,000 square metres, different take-up rates (or proportion of lots likely to be developed) are applied as shown in Table 3. As the model uses development density factors for lots over 2,000 square metres, a dwelling development rate is applied to the total potential yield for the relevant zones as shown in Table 4.

Table 3 Take-up rates for lots under 2,000sqm

	YIELD RULES		TAKE UP RULES (%)					
	No dwelling	One existing dwelling	INNER		MIDDLE		OUTER	
			No dwelling	One existing dwelling	No dwelling	One existing dwelling	No dwelling	One existing dwelling
NRZ 225-500	1	0	100%	0%	100%	0%	100%	0%
NRZ 500-2000	2	0	100%	0%	100%	0%	100%	0%
NRZ 750-2000	n/a	1	0%	100%	0%	50%	0%	30%
GRZ 225-450	1	0	100%	0%	100%	0%	100%	0%
GRZ 450-675 (dual occ)	2	1	100%	100%	100%	30%	100%	30%
GRZ 675-1000 (triple occ)	3	2	100%	100%	100%	30%	100%	30%
GRZ 1000-2000	8	8	100%	100%	100%	60%	100%	30%
RGZ 225-500	8	8	100%	100%	100%	100%	100%	100%
RGZ 500-1000	18	18	100%	100%	100%	100%	100%	100%
RGZ 1000-2000	36	36	100%	100%	100%	100%	100%	100%
ACZ, B1, 2, 5; C1, MUZ 225-500	11	11	100%	100%	100%	50%	100%	30%
ACZ, B1, 2, 5; C1, MUZ 500-1000	24	24	100%	100%	100%	50%	100%	30%
ACZ, B1, 2, 5; C1, MUZ 1000-2000	48	48	100%	100%	100%	50%	100%	30%

Table 4 Take-up rates for lots over 2,000sqm

	YIELD RULES			TAKE UP RULES (%)				
	INNER	MIDDLE	OUTER	INNER	MIDDLE		OUTER	
	Dw/ha	Dw/ha	Dw/ha	No or one existing dwelling	No dwelling	One existing dwelling	No dwelling	One existing dwelling
ACZ	120	70	35	100%	50%	50%	30%	30%
C1, B1, 2, 5	120	70	35	100%	50%	50%	30%	30%
C2, B3, 4	120	70	35	100% in and within 400m of AC	30%	30%	20%	20%
CDZ	120	70	35	100%	100%	100%	100%	100%
GRZ1-13	120	70	35	100%	100%	60%	100%	30%
IN1-3	120	70	35	100% in and within 400m of AC	30%	30%	20%	20%
MUZ, 1	120	70	35	100%	50%	50%	30%	30%
NRZ1-4, 7	120	70	35	100%	100%	60%	100%	30%
PDZ1-3	120	70	35	100%	100%	100%	100%	100%
R1,2	120	70	35	100%	100%	60%	100%	30%
RGZ1-3	120	70	35	100%	100%	100%	100%	100%
TZ			35				100%	30%

If Neighbourhood Residential, General Residential, Commercial 1 and Mixed Use Zone smaller lots are vacant, the model expects 100 per cent of those lots to be developed.

All Inner region NRZ lots between 750 and 2,000 square metres are anticipated to gain one or two new dwellings. In the other regions, NRZ lots with an existing dwelling are treated differently: in the Established Middle, only half of the lots between 750 and 2,000 square metres are expected to gain an additional dwelling, and only a third will do so in the Established Outer region. Lots in the NRZ over 2,000 square metres with an existing dwelling are modelled with a 60 per cent dwelling development rate in the Middle region and a 30 per cent rate in the Outer region.

The Neighbourhood Residential Zone also overlaps extensively with Inner region's heritage overlays and thus reduces the dwelling yield potential of that zone.

In the Middle and Outer regions, only one third of General Residential Zone lots between 450 and 1,000 square metres with an existing dwelling are modelled as gaining one or two additional residences. Sixty per cent of Middle region GRZ lots between 1,000 and 2,000 square metres are assumed to have an existing dwelling replaced by eight townhouses, and in the Outer region, this will only occur on one third of those lots. GRZ lots over 2,000 square metres with an existing dwelling in the Middle region are modelled with a 60 per cent dwelling development rate and a 30 per cent rate in the Outer region.

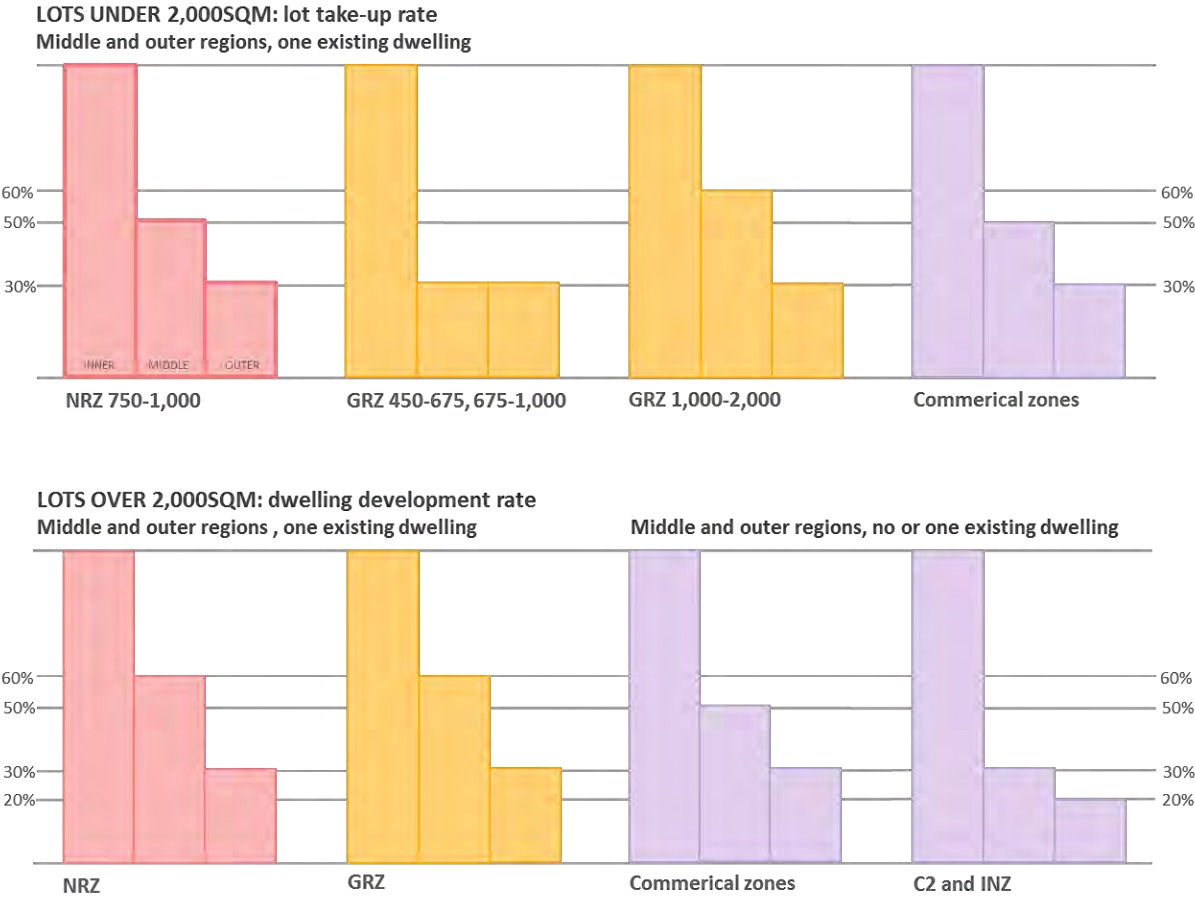
Through designating lots to Residential Growth, Comprehensive Development and Priority Development zones, councils have indicated their preference for short term redevelopment of these lots: the adopted take-up rate for these lots is 100 per cent.

This take-up rate is also applied to Commercial and Mixed Use Zone lots under 2,000 square metres and without a dwelling, anticipating a combination of future residential and non-residential redevelopment. An existing dwelling on smaller lots in these zones is assumed to be a disincentive to redevelopment in the Middle and Outer regions, regardless of lot size: a 50 per cent take-up or dwelling development rate applies to all Middle region commercial and Mixed Use zone lots and 30 per cent rates in the Outer region.

Commercial and Mixed Use Zone lots over 2,000 square metres which are vacant or have an existing dwelling in these zones in the Middle region have a dwelling development rate of 50 per cent and 30 per cent in the Outer region.

For zones which currently prohibit residential uses, the rezoning process may result in some redevelopment with a residential component. A 100 per cent dwelling development rate is applied to Commercial 2 and Industrial Zone lots in or within 400 metres of the Inner region's activity centres as these lots have clear locational advantages. In the Middle and Outer regions, developers are less likely to target these lots for redevelopment given their greater complexity: a 30 per cent dwelling development rate is assigned to lots in these two zones in the Middle and 20 per cent to those in the Outer region. Figure 8 Figure 8 graphically illustrates take-up rates by selected region, zone and lot size.

Figure 8 Take-up and dwelling development rates for selected zones and lot sizes by region



Findings: housing supply potential in Melbourne

Scenario dwelling yield and *Plan Melbourne*

The projected demand in *Plan Melbourne* to 2051 can be met largely within the established – or built up – city along with half the proportion of total dwelling growth allocated to Growth Areas in the plan. Established city growth is growth allocated to the City of Melbourne, including the large inner area brownfield sites, and to the existing suburbs; this excludes undeveloped ('greenfield') areas in the Growth Area municipalities. Findings are presented according to location (Inner, Established city and Growth Areas), residential and other zone types, and lot size within these categories.

Location

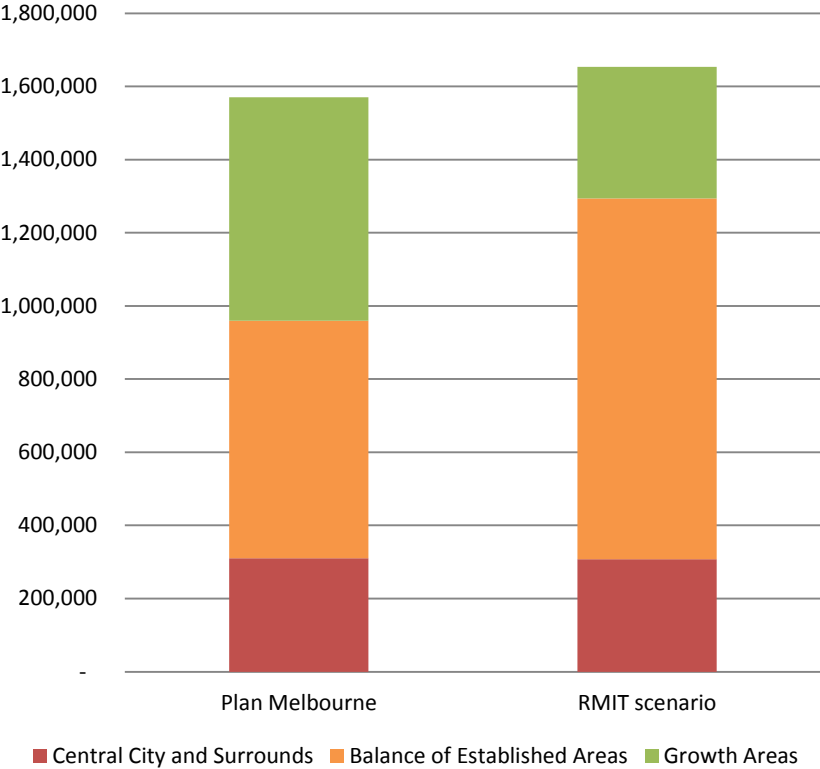
Accommodating dwelling growth under this report's scenario involves reallocating the proportions of dwellings defined in *Plan Melbourne*. Table 5 presents the results of this report's scenario aggregated against the categories and targets of *Plan Melbourne*.

As Table 5 and Figure 9 highlight, the scenario shows that projected future demand for dwellings can be met through a different approach to dwelling yield than stated in *Plan Melbourne*. *Plan Melbourne* anticipates that the Balance of Established Areas will accommodate 41 per cent of new homes by 2051: this scenario expects higher yields and a proportional contribution of almost 60 per cent in established suburbs. By contrast, this scenario sees a reduced proportion of future housing supply in Growth Areas: *Plan Melbourne* defines their contribution as 39 per cent, the scenario proposes just under 22 per cent. The Central City and Surrounds is 18.6 per cent, little different to *Plan Melbourne's* 20 per cent.

Table 5 Dwelling yields

Region	<i>Plan Melbourne</i>		Potential yield	
Central City and Surrounds	310,000	20%	307,458	18.6%
Balance of Established Areas	650,000	41%	986,375	59.7%
Growth Areas	610,000	39%	359,302	21.7%
TOTALS	1,570,000		1,653,135	

Figure 9 Dwelling yields by *Plan Melbourne* regions



The detailed breakdown of the scenario results are presented in Table 6, with potential supply reported against region, zone and lot size. Figure 10 provides more detail on the contribution of different categories to overall potential yield. Appendix A: Scenario results, documents the full results for all zones and by lot size.

Under the scenario, most future dwelling supply will be available in Melbourne’s Established Middle and Outer regions mainly on lots under 2,000 square metres. A total of 962,715 dwellings could be built in all zones or 58 per cent of total supply compared to the 650,000 or 41 per cent of supply proposed in *Plan Melbourne*. Of this scenario’s total, 697,208 dwellings could be accommodated on existing lots below 2,000 square metres and 283,014 on lots 2,000 square metres and above.

The Growth Areas could supply 359,302 dwellings under this scenario or 21.7 per cent of the metropolitan total. Precinct Structure Plans estimate 253,546 dwellings, 16 per cent of the metropolitan total, and land in the Urban Growth Zone could accommodate 105,756 dwellings at 15 lots per hectare. A range of additional scenarios are possible in the growth corridors: an increased average density of 25 lots per hectare could result in 70,000 more dwellings beyond 2051 on the same amount of land; alternatively the same dwelling yield to 2051 could be achieved on substantially less land.

The total projected dwelling yield from the Central City and Surrounds is 307,458 dwellings or 18.6 per cent of the total, compared to the figure of 310,000 dwellings projected in the metropolitan strategy *Plan Melbourne*. This region consists of two spatial areas. The first is the Central Business District and a ring of large brownfield sites around the CBD

comprising Docklands, Southbank, City North, Arden-Macauley, E-Gate, Fishermans Bend, Dynon and the Flinders Street to Richmond Station corridor. The City of Melbourne and the Victorian state government anticipate that these areas will provide an additional 178,700 dwellings when fully developed (see Appendix B: Estimates of future dwelling demand). Development in Docklands and Southbank is mainly in the form of high-rise residential towers, and Victorian Planning Ministers have approved a substantial number of high-rise residential developments mainly at the city end of the Fishermans Bend precinct. While the scenario accepts the existing estimated supply figures (see Appendix B: Estimates of future dwelling demand), adopting a different model of urban form for the large brownfield sites, based on traditional European dense medium-rise residential and mixed use development to six storeys, can yield almost the same number of dwellings as the returns from high-rise towers (see Appendix E: Methodology step two – Calculating lot-level yield potential). The second area includes the four inner urban municipalities adjoining the City of Melbourne: the Cities of Maribyrnong, Yarra, Stonnington and Port Phillip. The scenario estimates that infill from developable lots under 2,000 square metres could yield 58,911 dwellings, and from lots 2,000 square metres and above 69,847 dwellings. The large infill lots include sites such as the Alphington Paper Mill and the Maribyrnong Defence site.

Contribution of zones in established suburbs

Under the scenario, while the Growth Areas and Expanded Central City both contribute significant supply, established suburbs provide the majority of potential supply across a range of zones. The scenario identifies 101,129 dwellings in the Inner region (part of the *Plan Melbourne* Central City and Surrounds region); 492,215 in the Established Middle and 470,500 in the Established Outer regions. To better understand the potential implications of this development, this section examines these results by zone, location and lot size as presented in Table 6.

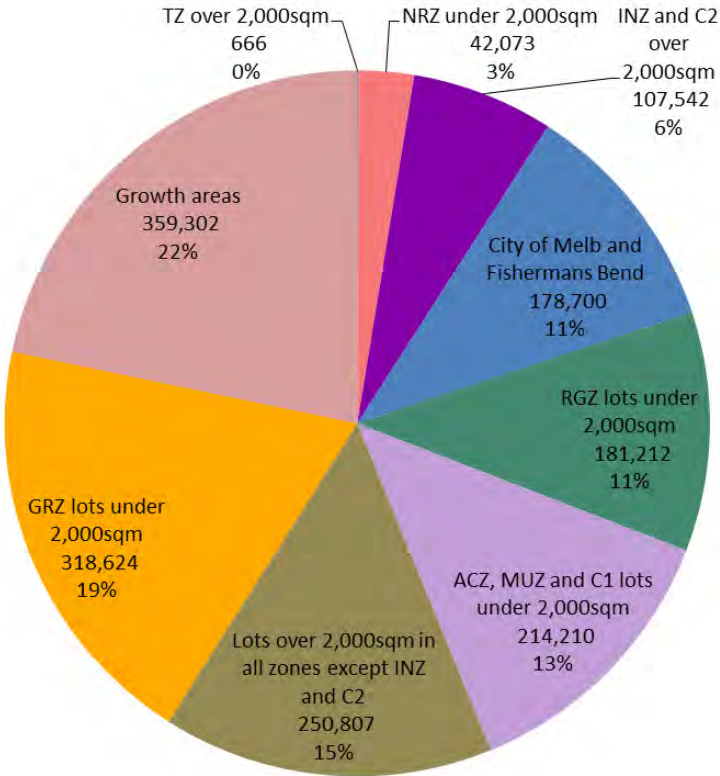
Table 6 Total dwelling yield

	Inner region	Middle region	Outer region	TOTAL
ESTABLISHED AREAS				
Residential zones				695,733
NRZ < 2,000sqm	865	26,836	14,372	42,073
NRZ > 2,000sqm	607	20,828	21,125	42,561
GRZ < 2,000sqm	20,111	133,656	164,857	318,624
GRZ > 2,000sqm	9,097	39,687	55,835	104,620
RGZ < 2,000sqm	6,344	76,000	98,868	181,212
RGZ > 2,000sqm	847	3,865	1,266	5,978
TZ > 2,000sqm	-	-	666	666
<i>Subtotal</i>	<u>37,871</u>	<u>300,872</u>	<u>356,990</u>	
Commercial and mixed use zones				
Commercial and mixed use zones				260,570
ACZ, C1Z, MUZ < 2,000sqm	31,591	123,048	59,571	214,210
ACZ, C1Z, MUZ > 2,000sqm	14,158	15,916	4,622	34,696
CDZ, PDZ >2,000sqm	2,749	4,322	4,594	11,665
<i>Subtotal</i>	<u>48,498</u>	<u>143,285</u>	<u>68,787</u>	
Non-residential zones				
Non-residential zones				107,542
C2Z >2,000sqm	8,551	5,861	6,154	20,566
INZ >2,000sqm	6,209	42,197	38,570	86,976
<i>Subtotal</i>	<u>14,760</u>	<u>48,058</u>	<u>44,724</u>	
Total yield from zones	101,129	492,215	470,500	1,063,844
Other large infill redevelopment sites				
Other large infill redevelopment sites				51,288
Lots over 2,000sqm	27,629	17,420	6,240	
EXPANDED CENTRAL CITY				
EXPANDED CENTRAL CITY				178,700
City of Melbourne and Fishermans Bend				
GROWTH AREAS				
GROWTH AREAS				359,302
Precinct Structure Plans				253,546
Vacant land				105,756
				<u>1,653,135</u>

Note that Central City and Surrounds is equivalent to this table's Inner region + Expanded Central City figures.

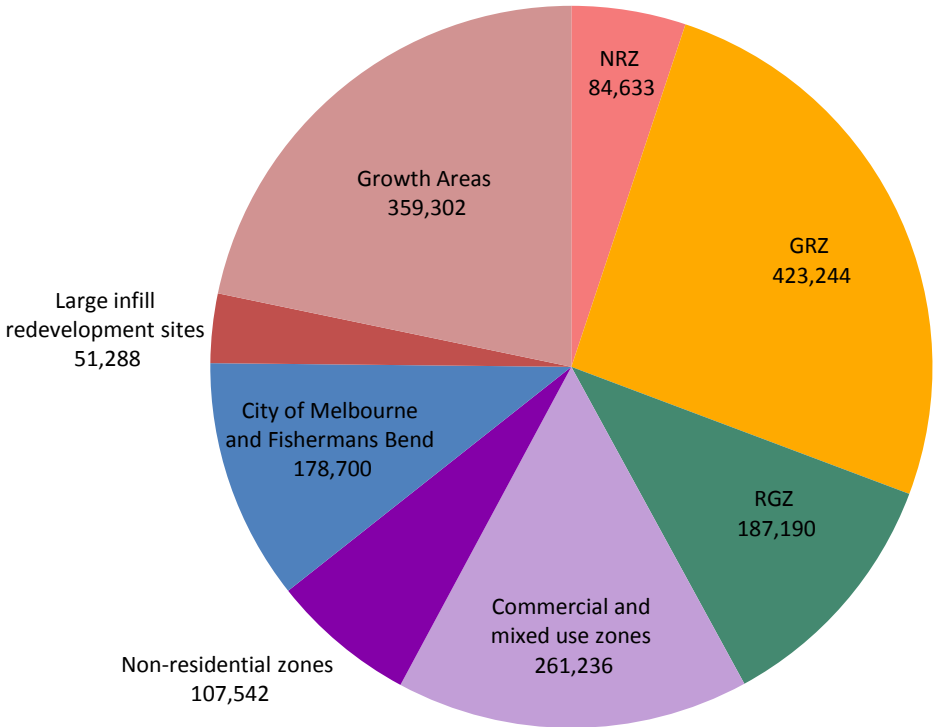
See Appendix A: Scenario results for a further breakdown of yields by zone and area

Figure 10 Contribution to potential yield by various categories of lots types or areas



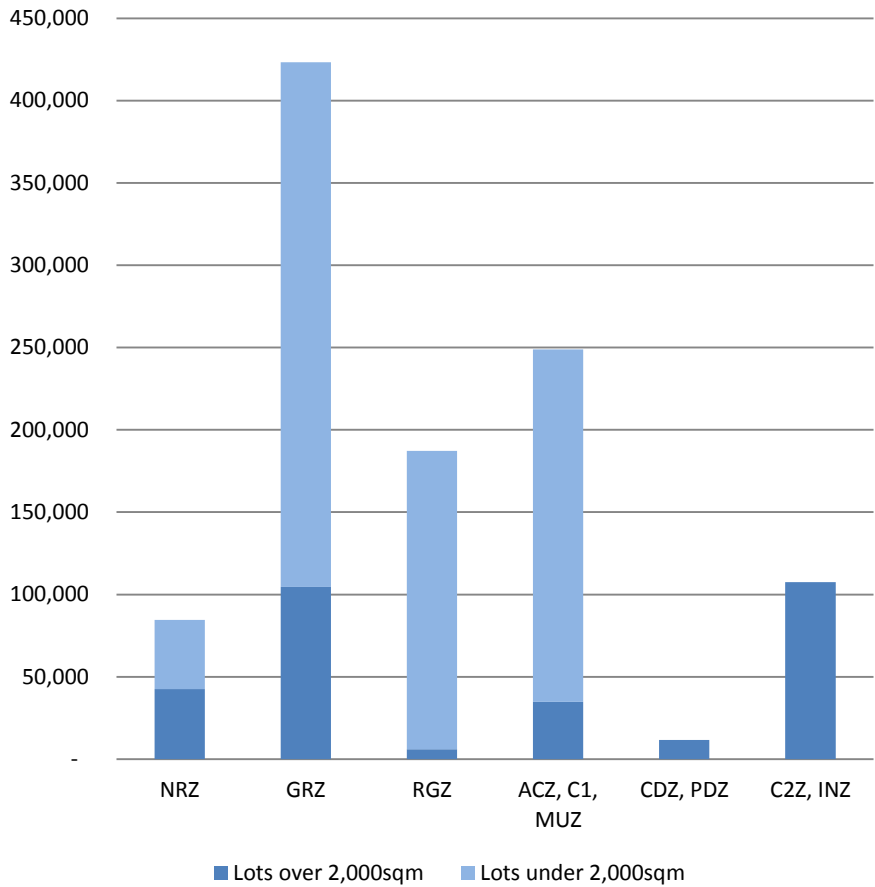
At 42 per cent of the total, the residential zones in the established suburbs provide the largest proportion of future dwellings. Most of this growth under the scenario is projected for the General Residential Zone, and on lots below 2,000 square metres. The estimated yield from the major residential zone, the General Residential Zone, has five times the yield of the most restrictive zone, the Neighbourhood Residential Zone, and double the yield from the most development-oriented zone, the Residential Growth Zone (see Figure 11).

Figure 11 Dwelling yields by zone and location



Under the recent zone reforms, the new General Residential Zone is applied to the largest area (70,555 hectares). This wide application, the relatively liberal zone requirements and the rules used by the scenario model mean that this zone also has the highest yields in the established suburbs, particularly from small lots (lots under 2,000 square metres) as illustrated in Figure 12. Just over half of the 423,244 additional dwellings calculated for the General Residential Zone are located in the established outer suburbs. This reflects the larger lot sizes and relatively low densities of Melbourne’s established outer suburbs. These areas offer an opportunity for redevelopment, particularly on well-located lots close to activity centres and public transport.

Figure 12 Potential dwelling yield by zone and lot size



The General Residential Zone’s development potential represents about 61 per cent of the 695,733 total possible new dwellings of in the three main residential zones. Of these, 318,624 dwellings could be built on lots below 2,000 square metres including 115,361 medium density dwellings on lots between 1,000-2,000 square metres. This assumes that sixty per cent of Middle region and one third of Outer region GRZ lots between 1,000 and 2,000 square metres will have an existing dwelling replaced by eight townhouses, and that one third of lots between 450 and 1,000 square metres in the Established Middle and Established Outer regions will gain one or two additional dwellings. Lots above 2,000 square metres zoned GRZ have the potential for 104,620 dwellings assuming that 60 per cent of dwellings will be built on developable lots in the Middle region at an average density of 70 lots per hectare, and 30 per cent in the Outer region at 35 lots per hectare. The inner municipalities’ three main residential zones have potential for only 37,871 dwellings, with the largest possible supply of 20,111 in the General Residential Zone on lots under 2,000 square metres.

The Neighbourhood Residential Zone provides just under one fifth of the potential yield of the General Residential Zone with 84,633 dwellings on 26,400 hectares, just over one third of the land zoned General Residential. Again, the greatest yield could be on lots under 2,000 square metres at 26,836 in the Middle region while total yield from the NRZ in the inner suburbs is very low at 1,472 dwellings, This zone could accommodate a total of 42,561 dwellings on lots above 2,000 square metres assuming a take-up rate of 50 per cent in the Middle region and 30 per cent in the Outer region. The low yield from the NRZ

reflects the limited spatial application of the zone and the assumption of only one additional dwelling per lot. Also, this scenario assumes that dual occupancy is not possible on lots between 225 and 500 square metres, and that only one half of lots between 750 and 2,000 square metres in the Middle region and one third in the Outer region will gain one additional dwelling by 2051.

At just one per cent, the Residential Growth Zone is applied to even less residentially zoned land in the established suburbs than the NRZ, yet it has the potential for 187,190 dwellings. Again, the vast proportion of potential dwellings from this zone, 181,212 or 11 per cent of the total metropolitan supply, is located on lots under 2,000 square metres. Assumed site densities range from 221 to 240 dwellings per hectare. Relatively few lots over 2,000 square metres are zoned RGZ so their estimated yield is small, at just under 6,000 dwellings across the three regions.

This pattern of potentially high yield from relatively small lots continues in the Commercial 1 (C1Z), Activity Centre (ACZ) and Mixed Use Zones (MUZ). The C1Z and ACZ are located in activity (or shopping) centres and along retail and commercial strips served by tram routes in the Inner and Middle regions, while the MUZ is usually located on land adjoining commercial and retail areas. These zones could potentially accommodate almost a third more dwellings – 248,905 – than the Residential Growth Zone, the zone intended for the highest intensity of residential development, on almost the same number of lots under 2,000 square metres. This potential yield is also greater than that from large inner urban brownfield sites in the City of Melbourne and Fishermans Bend. The model assumes four storeys of residential use and two storeys of other uses at average site densities of around 325 dwellings per hectare. It also assumes a take-up rate of one half of all lots in the Middle region and one third in the Outer region. The other main non-residential zones, the Commercial 2 and Industrial Zones potentially could provide another 107,542 dwellings.

Dwelling supply from non-residential zones (outside the three main residential zones) could offer significant housing opportunities for Melbourne's future population. Dwelling yields in the Commercial, Industrial and Mixed Use zones (368,112) together with yields in the large brownfield sites in the City of Melbourne and Fishermans Bend (178,700), the Residential Growth Zone (187,190) can potentially accommodate almost 750,000 new dwellings.

Protecting Heritage

The last action in applying step one, Lot Selection (see Supply Scenario on page 14), excludes lots with heritage overlays or with buildings developed prior to 1945. The impact of removing those lots is evident through a calculation not included in the final scenario results: the same yield rules, take-up and dwelling development rates as described in steps two and three are applied by zone and region to the lots under heritage overlays or with pre-World War II buildings. These lots could potentially yield 208,688 dwellings if not protected or excluded from the model.

A subset of this calculation is the 3,291 lots under 2,000 square metres excluded along tram routes. Lots along tram arterials with a heritage overlay have a potential yield of 36,230 dwellings and lots with buildings which pre-date 1945 could have potentially have 15,843 dwellings. Under the scenario rules, these lots are not eligible for development. The

total potential yield from lots *without* heritage overlays or buildings which pre-date 1945 along tram lines is 29,822 dwellings; this figure is included in the final scenario.

Figure 13 demonstrates the impact of the Heritage value characteristic at the intersection of Moreland and Sydney Roads at the southern end of the Coburg Activity Centre, and Figure 14 illustrates the three variables of the characteristic – Heritage Overlays, buildings developed prior to 1945 and those built after 1945 – within the Activity Centre along Sydney Road.

Figure 13 Opportunities for infill redevelopment along tram routes



Heritage Overlay
Total potential yield: 36,230

Buildings which pre-date 1945
Total potential yield: 15,843

Remaining eligible lots
Total potential yield: 29,822



Figure 14 Sydney Road application of Heritage value characteristic



Source: Google Maps

Larger infill lots

In all the zones and regions, larger lots above 2,000 square metres have important potential for residential and non-residential redevelopment: they could contribute around 22 per cent, or 359,014 additional new dwellings across the metropolitan area. Figure 15 illustrates the location of all of these larger lots in the Middle region and Figure 16 shows their distribution by zone within the City of Whitehorse, including sites identified in the Urban Development Program.

Figure 15 Middle region lots over 2,000 square metres

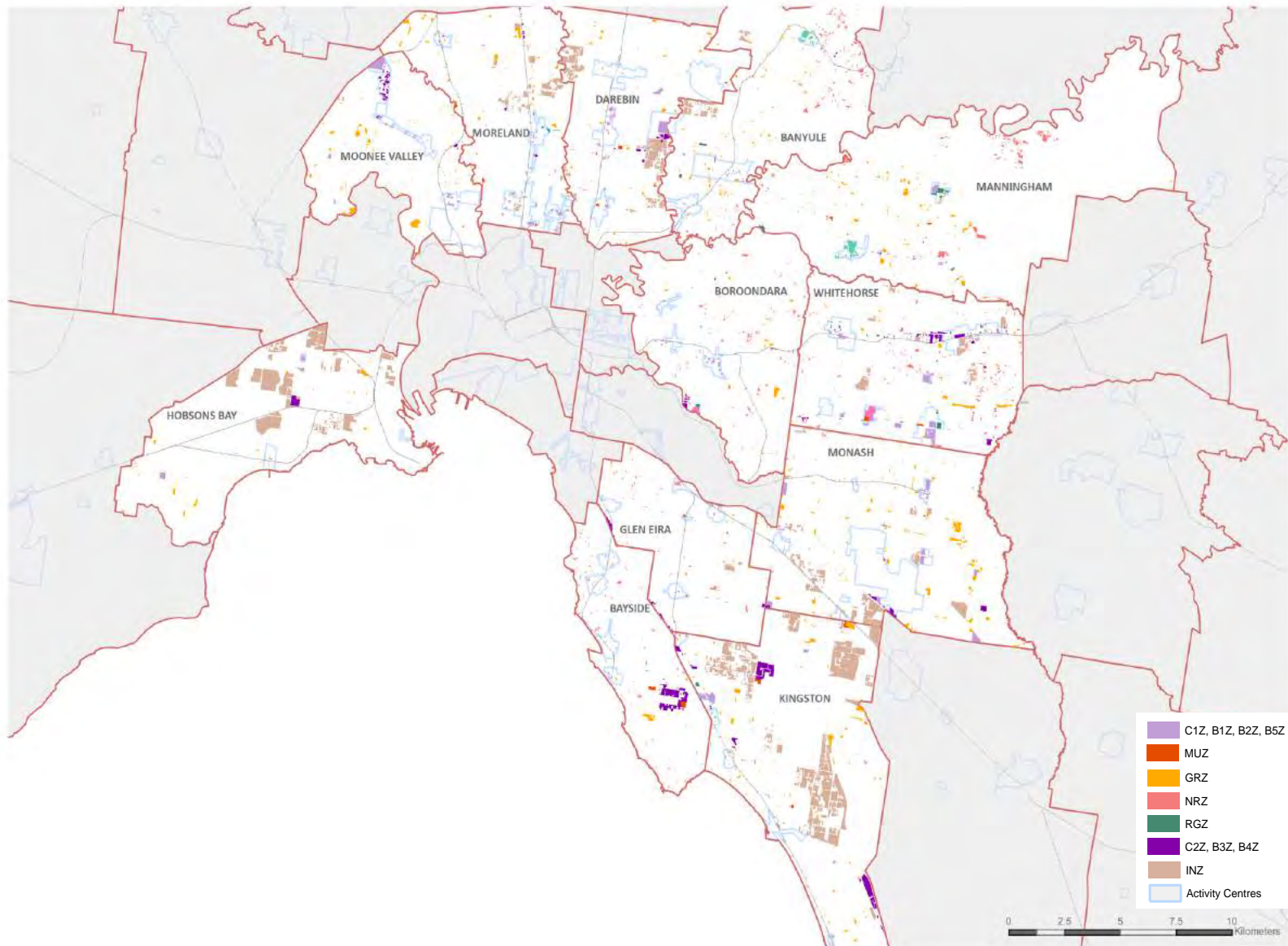
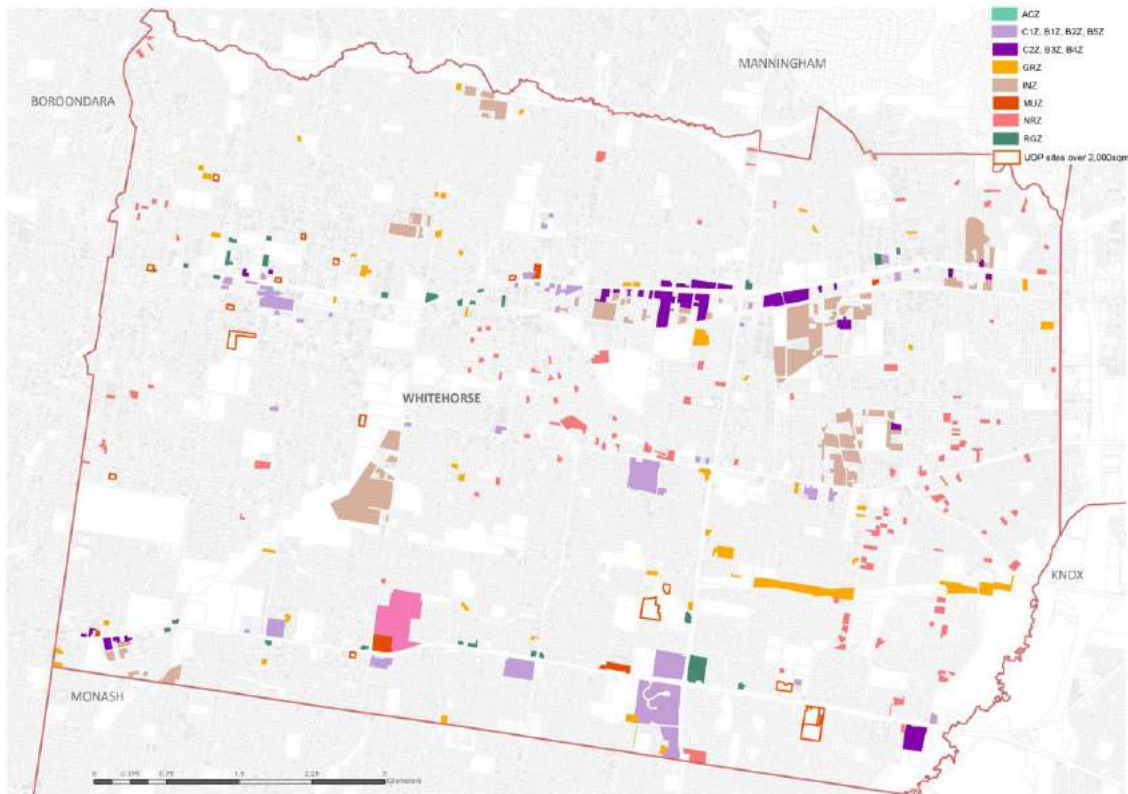


Figure 16 City of Whitehorse lots over 2,000 square metres



In addition, other large areas appropriate for residential infill may be available, such as VicTrack land, council shopping centre car parks, new large retail centres with potential for mixed use development, and rail line air rights. Many other sites could have significant additional yields to those estimated under the zone analysis in this report. Some have been identified in the Urban Development Program which includes 2,300 infill sites with a potential yield 179,386 dwellings (but also many lots over 2,000 square metres identified here) summarising the potential of larger sites for redevelopment focus. Large employment centres and some activity centres such as Coburg, Preston and Sunshine could include significant additional housing in mixed use redevelopments. Large suburban redevelopment sites such as the Maribyrnong Defence Site, former Fitzroy Gas and Fuel site and the former Alphington Paper Mill site will provide extensive dwelling development. When added to large inner brownfield sites and industrial and Commercial 2 zone site conversion, these large sites will make a large contribution to future dwelling supplies and represent a major source of land to meet projected dwelling demand.

Discussion

Achieving the required proportion of established city growth will require levels of urban consolidation unprecedented for Melbourne. Projected dwelling growth can be accommodated while protecting Melbourne's remaining heritage buildings and without the large scale demolition of existing suburban housing. How this growth occurs presents one of the greatest policy challenges for Melbourne.

Since the adoption of Melbourne's 1954 Plan, planners, developers and governments have assumed that most new growth should be located in new suburbs on the continually extending urban fringe. However, housing preferences of Melbournians are changing. Fewer people proportionately and in absolute numbers seem willing to move to outer urban growth areas. The scenario presented in this report represents a significant change to the traditional pattern of development in Melbourne. The scenario allocates 78 per cent of new dwelling growth to the inner city and established suburban areas. The remaining 22 per cent calculated for Growth Areas almost halves the 39 per cent projected in *Plan Melbourne*, and is well below the current trend figure of 28 per cent. This means that the inner city and established suburbs contain enough land to meet the almost all of the dwelling requirements of a growing population.

The monocentric nature of Melbourne's urban form has led to land prices decreasing with distance from the city centre. Lower land prices in new outer suburbs reflect the relative lack of employment opportunities, distances from advanced business services, professional and knowledge sector jobs, inadequate provision of services and infrastructure and the need for long distance travel. The decline in outer urban appeal may also reflect the design and general amenity of new car-dependent suburbs, where walking to destinations is difficult, uses are separated and housing remains relatively uniform and inadequately matched to household needs. But the ABS has documented more approvals for multi-unit dwellings than new detached houses in metropolitan Melbourne, and the approval numbers for inner city apartments, established suburban area townhouses and apartments, and Growth Area detached housing are almost identical (ABS, 2015).

Current residential development is largely ad-hoc, driven by developer preferences under a facilitative land use planning system. This market-led approach is leading to large scale detrimental impacts. Unprecedented levels of high-rise and low quality buildings dominate significant areas of the inner city with considerable off-site functional and amenity impacts. These buildings generally do not appeal to individuals from the established suburbs now forming new households, yet this growing demographic group will demand many new dwellings.

The government can intervene to transform the high-rise model of urban form in the Central Business District and brownfield, commercial, mixed use, industrial and residential areas. Traditional European urban form with three to six storey apartment buildings and townhouse developments which perform to the highest environmental and amenity standards will appeal to new suburban households and establish Melbourne's reputation as a world leader in urban redevelopment and regeneration. The alternatives are stark: increasing disfunction or an urban form which will contribute to urban liveability, social equity, environmental performance and effective city functioning. This alternative urban form will require the state government and local councils to develop more effective

regulatory building codes and land use planning regulations for building type, quality, height and diversity. This applies particularly to large brownfield sites and inner and middle ring infill sites.

Melbourne has ample land with potential for redevelopment within the urban growth boundary. However, the assumptions governing the redevelopment of this land determine the yield and the type of new housing. The large expanse of brownfield and former industrial land almost circling the CBD is a particular advantage. The 178,700 potential dwelling yield from these areas coupled with dwelling yields from commercial and Residential Growth zones in inner and middle ring suburbs well-served by public transport could result in almost 750,000 new dwellings to meet about one third of projected dwelling demand.

Despite the potential of such large brownfield sites, most of Melbourne's increased population under the scenario will be located in the established suburbs. The emphasis in recent metropolitan planning strategies on the redevelopment potential of mixed use activity centres, and the potential yields of commercial and mixed use zones and former industrial sites, remain important. However, most redevelopment will occur in suburban residential zones under the scenario. Most will occur not in the zone intended for substantial development, the Residential Growth zone, but in the main zone, the General Residential Zone, and not on large lots over 2,000 square metres but on smaller lots. This projection accords generally with trends except that the scenario prevents medium density development on lots under 1,000 square metres.

In the scenario presented, the three main residential zones in the established suburbs outside the City of Melbourne and Fishermans Bend could meet 42 per cent of projected future dwelling demand, or 695,733 new dwellings. The differences in potential yields from residential zones reflect the proportions of land covered by residential zones as well as the development potential of the zones.

In the scenario, the NRZ allows only one additional dwelling on a lot although some Inner municipalities have sliding scales or allow more than two dwellings on a lot. The GRZ, in contrast, allows medium density development to occur to a height control nominated in a schedule or in Clause 55 of ResCode, with the scenario assuming nine metres or three storeys (although this does vary by council and areas within their boundaries). The RGZ allows development to 13.5 metres or four storeys.

Sixty one per cent of the scenario's potential development occurs in the General Residential Zone with the highest yields on the 400,000 smaller lots (under 2,000 square metres) in the Middle and Outer regions of established suburbs. The GRZ is applied over 70,555 hectares but its impact on existing housing under 1,000 square metres would be limited under this scenario by excluding medium density development and limiting the proportion of lots able to be developed. The scenario conservatively assumes that one third of GRZ lots between 450 and 1,000 square metres in the Middle and Outer regions could gain one or two additional dwellings. Similarly, the scenario's assumption that larger lots above 2,000 square metres in the GRZ will be developed progressively for medium density housing seems realistic. Lots above 2,000 square metres zoned GRZ could accommodate an additional 104,620 dwellings. Without government intervention, development in the GRZ will continue to be characterised by ad-hoc opportunistic and incremental lot-by-lot or multiple-lot redevelopment not necessarily well-matched to local

conditions and needs. These impacts could be reduced by identifying appropriate locations for medium density development, introducing density rules, examining the further application of the Heritage Overlay and developing consistent higher quality design rules.

Building design, urban design and housing diversity are likely to emerge as contentious issues, particularly for medium density dwellings in the GRZ and higher density development in the RGZ. At present, a development culture predominates which allows up to 100 per cent site coverage for medium and high-rise buildings. This is a radical divergence from the type of intensive medium density development common prior to 1945 in inner suburbs when site coverages of between 35 to 50 per cent delivered high density, high quality building design and significant site specific open space (see Appendix H: Other housing typology examples, Melbourne: historical examples). High quality urban design criteria and lower site coverage rules should be developed for the projected multi-unit development on lots over 1,000 in the GRZ. The RGZ allows development to four storeys and high site coverage which may reinforce the current trend where one and two bedroom apartments dominate and are often of low quality. This zone affects only one per cent of residential land and a relatively small number of lots under 2,000 square metres (11,893) but could produce a large yield of 181,212 dwellings or 12 per cent of the total. Opportunities should be investigated to expand the extent of this zone given its high comparative contribution to future dwelling supply.

The scenario demonstrates that the new residential zones do not adversely restrict land for redevelopment in the middle ring suburbs, or constrain the supply of new dwellings to meet overall metropolitan housing demand. Councils outside the central city have applied the NRZ to varying extents as a proportion of the three main residential zones, ranging from the City of Glen Eira's 84 per cent to the city of Monash's one per cent (see Figure 17). But the area affected by the NRZ is only 17 per cent of the total area of the three main residential zones. Combined with the scenario lot yield assumption of only one additional dwelling and no medium density development, land area directly influences the NRZ's more limited potential yield to about one fifth of the GRZ's.

In addition, the area covered by the NRZ as a proportion of municipalities' total areas is small compared to the zone's proportion of residential zoned areas: in Glen Eira the NRZ only affects 55 per cent of the municipality's area compared to 84 per cent of the residential zones; and in Boroondara 48 per cent of the municipality compared to 78 per cent of residential zones (see Figure 17 and Figure 18). The NRZ applies only to about 12 per cent of all zoned land: development limitations in this zone lead to minor impacts on land supply because of the GRZ's large spatial distribution together with the large potential supply of non-residential land for residential redevelopment.

Figure 17 Proportion of municipalities' residential areas zoned NRZ, GRZ and RGZ

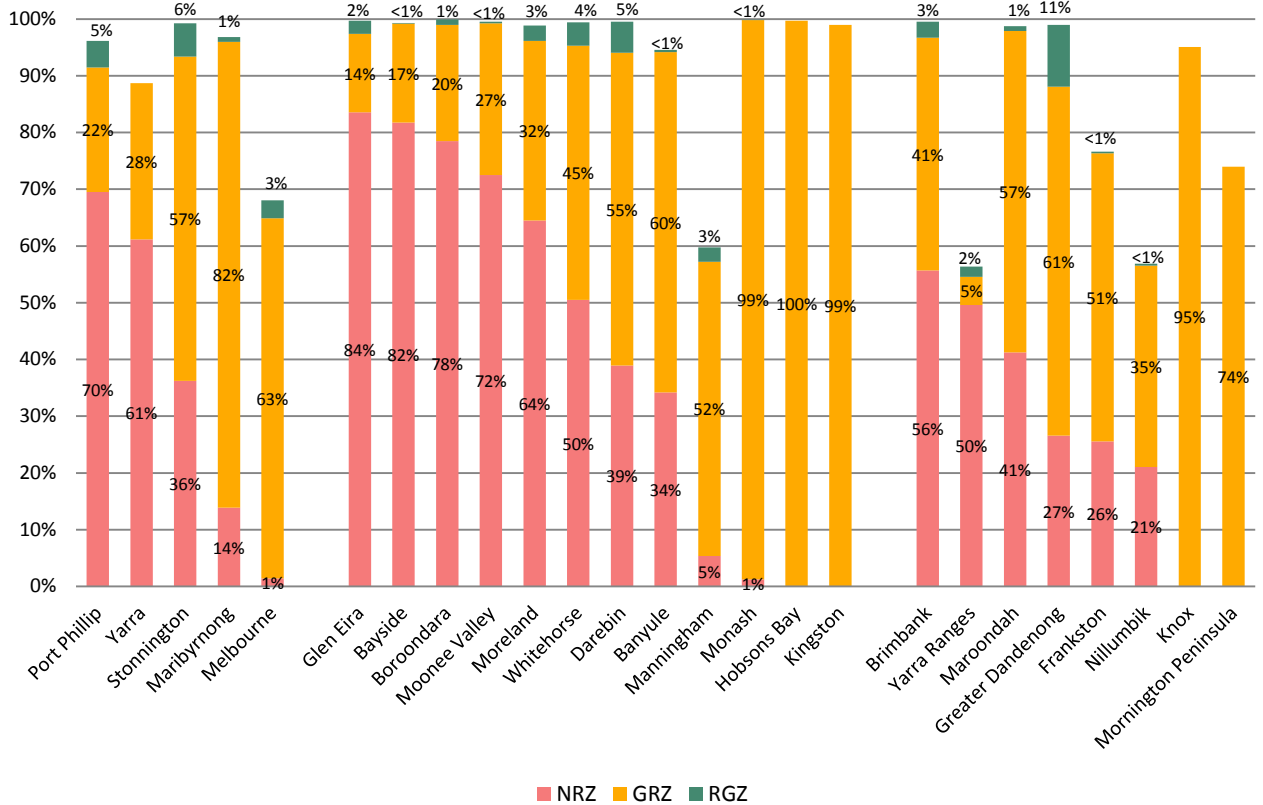
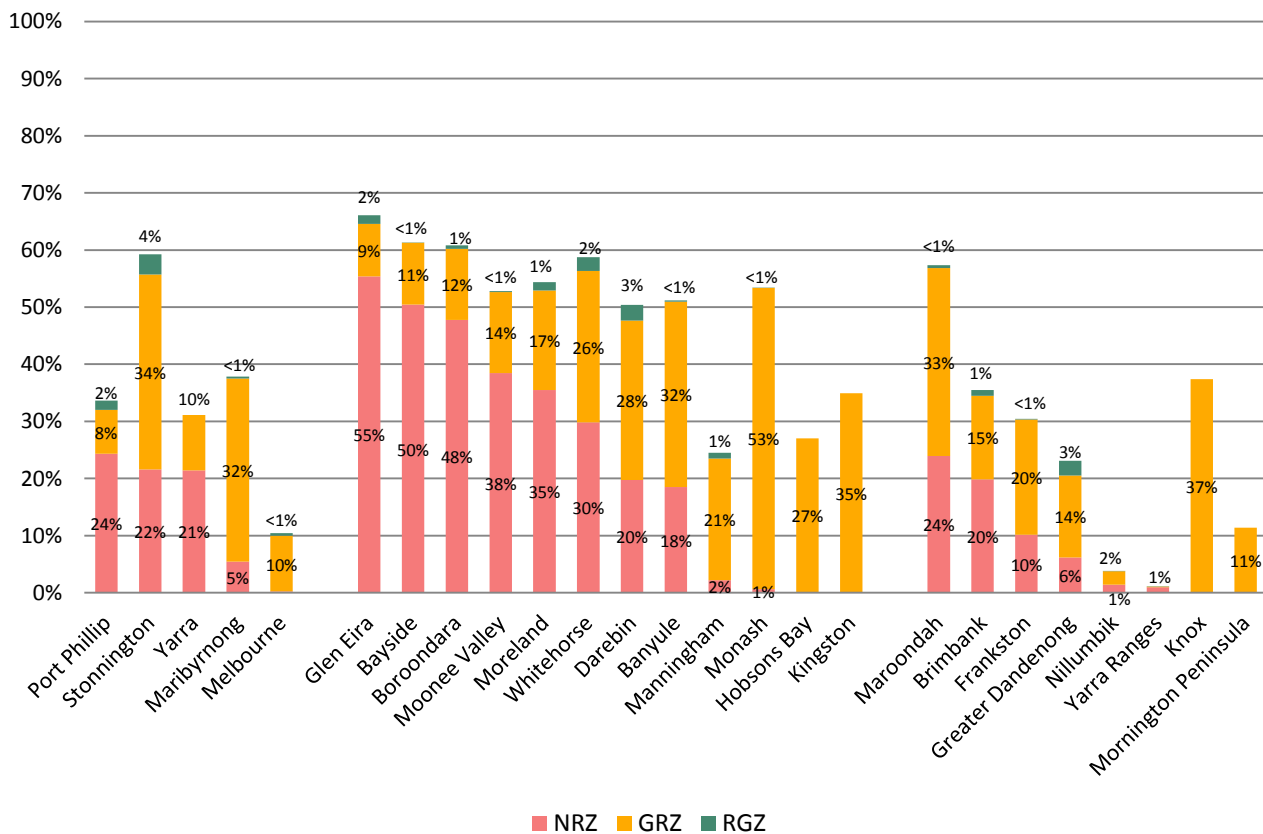


Figure 18 Proportion of municipalities' total areas zoned NRZ, GRZ and RGZ



Redevelopment of all eligible NRZ and GRZ lots under 1,000 square metres as dual or triple occupancies would lead to inefficient redevelopment of large areas of Melbourne because

of low lot yields and loss of amenity. A more efficient use of land would limit development on smaller lots, concentrate medium density development on larger lots and large infill sites zoned GRZ. This approach could take advantage of large potential supplies of land in middle ring and other established suburbs to meet the housing demands and preferences of particular demographic groups. Newly forming households from these suburbs appear increasingly reluctant to purchase housing in high density inner areas or low density urban growth corridors. This approach could also protect Melbourne's most historic and highest amenity housing associated primarily with its Victorian, Edwardian and pre-1945 housing stock while not unduly restricting land supply.

Non-residential zones have extensive redevelopment potential, particularly the Commercial 1 Zone (C1Z) and conversions from industrial land. The MUZ also allows significant development particularly in inner suburbs because of the lack of regulatory control. Neither the C1Z nor the MUZ provisions restrict height or site density. Other planning provisions such as Heritage or Design and Development Overlay controls and Precinct Structure Plans may contain discretionary height and other controls on development but do not adequately protect the urban form of historic strip shopping centres. These centres are vulnerable to rapid transformation to medium and high-rise residential development either through demolition or façade development.

The scenario models the impact of protecting all pre-1945 buildings in residential and C1Z, ACZ and MUZ zones along tram routes from development. Redevelopment of all buildings along these routes could result in almost 82,000 new dwellings in four to six storey mixed use buildings. Protection of lots with an existing heritage overlay would almost halve the yield, while protecting all pre-1945 buildings would reduce potential yields to 29,822 dwellings. This demonstrates that a large heritage and amenity benefit – which has significant economic value particularly in attracting advanced business professions and knowledge workers – results in a small overall loss of potential dwelling supply.

The scenario shows that the demand for dwellings in Melbourne can be met to 2051 while retaining historic and high amenity suburban housing in the NRZ and historic retail centres, and limiting redevelopment on lots under 1,000 square metres in the GRZ. Vast areas of Melbourne's suburban housing do not need to be redeveloped to satisfy projected housing demand. Similarly, protection of the architecture of Melbourne's pre-1945 strip shopping centres by preventing their redevelopment will not dramatically limit the supply of required dwellings. It makes no sense to demolish historic retail strip centres while there are such large potential supplies of land zoned MUZ, C1Z and potentially RGZ, and a range of infill sites, immediately adjacent or close to these centres.

The large potential supplies of land in both residential and non-residential zoned areas in middle ring and other established suburbs are more appropriate for additional new homes than land developed at low densities in new fringe suburbs. The proportion of outer urban growth corridor housing could be reduced through only slightly increasing densities and without unduly affecting metropolitan dwelling demand projections. Increased average residential densities in growth corridors would save significant amounts of land while yielding the same dwelling supplies, or could allow the long term supply of growth corridor land to be extended. The planned concentration of high amenity, diverse housing options within the established city could contribute to reducing the need for outer urban development to proportions to or below the scenario's proposed 22 per cent.

Current development trends are leading to a range of undesirable impacts including the inefficient use of land and infrastructure, poor quality high-rise developments, and insufficiently diverse outer urban housing types remote from employment and services. An evidence-based approach to metropolitan-wide housing supply requires a comprehensive and robust method for estimating the housing supply potential of a city, and for modelling different policy scenarios and related market behaviour to estimate future supply. In turn, this implies a strong role for government in identifying land supply and refining redevelopment design and density rules.

Policy implications

Detailed residential infill site investigation:

This report has identified a range of infill sites available in zones for every municipality along with a potential yield using the stated density and design assumptions. These sites vary in size. In partnership with the state government and building on the Urban Development Program process, local councils should analyse and prioritise these sites for potential redevelopment using means such as multi-criteria suitability analysis (see Appendix F: Methodology step three – Applying take-up rates). The state government should lead the process of developing master plans and design guidelines for larger sites. Local councils should play the major role in using information provided in this report to identify development opportunities which will help match local dwelling demand to land supply on other infill sites within municipalities.

A detailed audit of infill sites and their development potential to supplement the information contained in the Urban Development Program could focus on:

- Extensive areas with potential for conversion from industrial to residential uses particularly in northern and western suburbs and some middle ring outer and southern suburbs. Retention of significant industrial land is important for Melbourne's future employment and development options, but the ongoing shift away from an industrial economy is making available further land for residential and mixed use development.
- Commercial 2 zoned land appropriate for rezoning for residential development. C2Z land provides opportunities for employment in creative and other industries often close to the CBD and much should be retained. However, identifying suitable C2Z land and its rate of take-up should begin.
- The capacity of large employment clusters and some major activity centres to provide additional housing as demonstrated by the yields under zone calculations in this report. Detailed evaluations should be undertaken of the potential yield from these key locations and their development facilitated. Significant yields are available through land assembly in major activity centres such as Coburg, Preston and Sunshine, and through redevelopment opportunities in other activity centres without heritage constraints.
- Other significant urban and suburban infill sites which offer large potential development returns, such as the Maribyrnong Defence Site, former Gas and Fuel site in Fitzroy and Alphington Paper Mill site. Mixed use development of council car parks, for example, offer potential benefits both to dwelling yield and traditional shopping centres.
- Longer term planning for redevelopment of railway sites including some VicTrack land.

- The development and implementation of appropriate context-specific design and density criteria and associated regulatory mechanisms to achieve desirable development and amenity outcomes for GRZ sites and larger infill sites of varying sizes, including site coverage and height controls. These, along with land size, will affect yield and should be related to the relevant urban contexts. A number of municipalities have already adopted a similar approach and have identified potential yield from infill site redevelopment.

This approach would shift away from the arbitrary allocation of housing targets to municipalities as part of a Housing Strategy or through state government policy. Housing targets ignore local housing types and conditions, available land supply both locally and on a metropolitan and regional scale, and local impacts. Councils should have an important strategic role in site identification and developing rules for redevelopment particularly on sites over 2,000 square metres within their municipalities rather than maintaining a too-commonly reactive role in assessing developer proposals under a facilitative planning system.

For large brownfield sites and the CBD, Victorian state government departments and the City of Melbourne should work collaboratively to develop strategies and development of master plans for these large sites and the protection of heritage and amenity values of the CBD. Rather than relying reactively on private sector proposals, these plans should replace the dominant high-rise model and use high quality urban and environmental design principles, and mandatory height controls, to require a dense European form of three to six storey apartments and townhouses. Residential development goals for these sites should include accommodating a significant proportion of newly forming and family households in a variety of dwelling types. Overall dwelling yields on the brownfield sites should aim at achieving at least the densities available from current high-rise construction.

Residential zones:

Further collaborative and detailed residential zone policy development between councils and state government is urgently needed to gain desirable development outcomes. The development assumptions in this report should be considered or alternatives tested and implemented. State and local policies on density, minimum lot size, building and subdivision design and lot coverage, the application of the Heritage Overlay, and appropriate development locations particularly for the GRZ are required to avoid inappropriate redevelopment poorly matched to sites. ResCode should be revised to achieve consistent high quality design for medium density development and low rise apartment construction, and include density rules which reduce site coverage and are matched to location, such as public transport proximity. The appropriate use of the Heritage Overlay for areas in the GRZ should be re-examined. The impact of increased populations on existing infrastructure and services, such as open space, should be a mandatory factor in decisions in increased density and location. Municipalities should consider expanding the spatial extent of the RGZ because of the high potential returns from a small land area. The state government should introduce mandatory height controls for the MUZ to more closely reflect those in the RGZ. In addition, use controls for the MUZ are too broad and should be narrowed to reflect the residential nature of the zone.

Regulatory reform: Heritage Overlays and Precincts

This report has demonstrated that protecting all pre-1945 buildings with heritage value reduces the total potential metropolitan dwellings by less than 15 per cent. Specifically preventing redevelopment along tram routes on lots with buildings which pre-date 1945 reduces total dwelling potential by three per cent. More narrowly defining protection to Victorian architecture will result in an even smaller proportion of foregone development.

The current Heritage Overlay is an inadequate protective measure. Stronger overlay provisions or an additional level of development control is needed to prevent the extensive demolition of strip shopping precincts and to avoid façade development. Entire streetscapes and building envelopes need protection along with the lots on which they are located. A precinct heritage planning approach could be strengthened and applied more widely, under the ambit of the Heritage Act or separate legislation.

Conversely, buildings without significant heritage value could be redeveloped using a traditional European model of up to six storeys. Rather than relying on ineffective structure plans, councils need to develop specific design guidelines and mandatory planning density and height controls for such areas, similar to the approach recommended for infill sites.

Growth corridor development:

The substantial fall in absolute and proportional amounts of outer urban development in relation to total metropolitan development provides the opportunity to permanently reduce Melbourne's traditional reliance on low density lots on the urban fringe. Growth Area housing supply must be related strongly to overall metropolitan housing demand and supply.

The first step is to make available sufficient housing in suitable locations in the established and inner city regions as previously described. Providing diverse housing options in the existing city will satisfy most demand and better meet state and local government housing objectives rather than simply making more land available incrementally on the urban fringe. Secondly, the state government should limit urban fringe dwelling construction to a maximum of 20 per cent of the total. This would more generally reflect the current proportion of residential dwelling approvals in the Growth Areas.

State and local governments should also evaluate and implement other options to significantly increase residential densities on greenfield land through Precinct Structure Plan requirements to: require (rather than simply encourage) more diverse housing types including lower cost dwellings to better match varied housing needs on significantly less land; produce a more functional and better performing urban form linked to varied employment opportunities; reduce impacts on services, natural resources and the physical environment; and, provide high amenity living environments including adequate and varied parks and other open space, and high quality public transport connections.

Regional development options:

Many regional urban centres are also projected to increase in population to 2051. They are smaller in scale but have similar urban form characteristics to Melbourne. The state government should examine the potential to divert a proportion of the planned increase in metropolitan population to regional centres, and how such an objective could be

achieved. The government and relevant local councils should identify suitable residential development locations within regional township boundaries and make these locations a policy priority for population and dwelling increases, especially where well-served by public transport. These redevelopment opportunities for varied housing types should be given priority over the fringe expansion of towns. Regional Growth Plans have commenced this process but need revision to better and specifically address future housing demands, particularly in relation to Melbourne and a state-wide network of urban centres. Regional development should be integrated with fast rail transport using a network city model.

Cross-sectoral impacts:

All development options in the scenario examined will require consideration of a range of cross-sectoral factors. In particular, a city of eight million people containing significant areas of intensified housing will need high quality frequent public transport services; significant expansion of open space; revitalised traditional shopping centres and an end to reliance on stand-alone retail malls and 'big-box' retailing; encouragement of mixed use employment centres; protection of remaining heritage and amenity; and expansion of services and other necessary infrastructure. Integrated planning of this type and scale will require a reorganisation of government structures away from the current 'silo' departmental approach towards cross-sectoral arrangements.

Conclusion

This report is a comprehensive lot level analysis of available land supply compared to future dwelling demand and is intended to be a contribution to assessments of the capacity of metropolitan Melbourne to cater for substantial population growth. The report's estimates of land available for development in spatial areas and across land use zones are affected by assumptions about dwelling yield and development take-up rates. The task of assessing land supply and matching it to dwelling demand is critical regardless of how it is achieved. A future strategic plan for Melbourne should include a thorough analysis of how land supply can meet projected dwelling demand.

A range of detrimental impacts will accrue from more limited approaches to land supply, such as unrestricted activity centre development, tramway arterial redevelopment or broad-scale reconstruction of middle and outer suburban areas. Only a metropolitan-wide assessment of land supply with desirable density and design parameters will meet the complex social, environmental and economic needs of a future population twice its current size.

Finding sufficient suitable land for such a population increase depends on values as much as evidence. The majority of required land is located within the existing built-up metropolitan area and can cater for a population of eight million people by 2051 if outer urban growth corridor expansion is limited to around 22 per cent of new dwellings. This represents almost half the proportion of outer urban development proposed in the latest metropolitan strategic plan, *Plan Melbourne*. Future metropolitan strategic planning should recognise that reliance on the two dominant types of dwelling, detached outer urban housing and inner urban apartments, is neither necessary at the current levels nor desirable. The potential for population increases in regional settlements linked to Melbourne by high quality public transport has never been adequately examined in Victoria. This option should also be included in the task of finding solutions to future dwelling locations and type.

Scenario planning involves envisioning an alternative future and often includes a process of 'backcasting' to examine the steps required to achieve a desired future outcome. Notions of government are critical to this process. The deregulation of the land use planning system has allowed government to rely on facilitation of developer decisions as a solution to the problem of land supply. This is leading to a series of undesirable impacts. Only a greater level of government involvement in policy formulation and a planning system which achieves desired outcomes will allow Melbourne to continue to function successfully. The absence of integrated, anticipatory policy settings will seriously limit the capacity of the city to adapt successfully to rapid, fundamental change. Ultimately, Victorians are going to have to rediscover the principles of cross-sectoral governance and integrated planning if Melbourne at eight million is to remain a liveable, high amenity, productive, equitable and effectively functioning city.

References

- Adams, R., 2010. *Transforming Australian Cities*, Melbourne: City of Melbourne.
- Australian Bureau of Statistics (ABS). 2015. *Building Approvals, Australia - various years*, Cat. No. 8731.0.
- Australian Bureau of Statistics (ABS). 2014a. *Regional Population Growth, Australia, 2012-13*, Cat. No. 3218.0.
- Australian Bureau of Statistics (ABS). 2014b. *Regional Population Growth, Australia, 2012-13, Feature Article: Capital Cities: Past, present and future*, Cat. No. 3218.0 (<http://www.abs.gov.au/ausstats/abs@.nsf/products/AC53A071B4B231A6CA257CAE000ECCE5?OpenDocument>, accessed 29 September 2015).
- Birrell, B., Healy, E., Rapson, V., Smith F, T. 2012. *The End of Affordable Housing in Melbourne?*, Centre for Population and Urban Research, Monash University.
- Buxton, M. and Goodman, R. 2014. The impact of planning 'reform' on the Victorian Land use planning system, *Australian Planner*, 51(2), 132-140.
- City of Darebin. 2015. *Darebin Housing Strategy 2013, Revised 2015*.
- Department of Infrastructure. 2002. *Melbourne 2030. Planning for sustainable growth*, State of Victoria.
- Department of Infrastructure and Transport. 2013. *State of Australian Cities*, Australian Government.
- Department of Planning and Community Development (DPCD). 2011. *Method to assess Melbourne's Housing Capacity*, State of Victoria.
- Department of Transport. 2009. *Macro-Urban Form, Transport Energy Use and Greenhouse Gas Emissions: An Investigation for Melbourne*. Prepared by Gavin Alford and Jeremy Whiteman, Transport Policy Analysis and Research Unit, State of Victoria.
- Department of Transport, Planning and Local Infrastructure (DTPLI). 2014. *Plan Melbourne Metropolitan Planning Strategy*, Victorian Government.
- Eckart, W. 1985. On the land assembly problem, *Journal of Urban Economics* 18(3), 364-37.
- Energy Victoria. 1996. *Urban Villages Project: Encouraging sustainable urban form*, Summary report, State of Victoria.
- Groenhart, L., Wood, G., and Hurley, J. 2013. Shaping modern cities: Structural continuity and change in Carlton, Melbourne 1870-1970 in *Proceedings of the State of Australian Cities National Conference 2013*, Sydney, 26 - 29 November.
- Groenhart, L. and Buxton, M. 2011. Touching the Void: A Social/Spatial Evaluation of Urban Structure Proposals for Melbourne, *State of Australian Cities Conference*, 30 Nov – 2 Dec, Sydney.
- Kelly, J. and Donegan, P. 2013. Councils opt for NIMBY approach on growth, *The Age*, 2 November.
- Kelly, J. and Donegan, P. 2015. *City Limits. Why Australia's cities are broken and how we can fix them*, Grattan Institute, Melbourne University Press.
- Millar, R, Fufe, M, Dobbin, M., 2012. The Land Dragons, *The Age*, October 21, 14.
- Ministerial Advisory Committee, 2012. *Melbourne, Let's talk about the future*, Department of Planning and Community Development, State of Victoria.
- Newton, P. et al. 2011. *Towards a new development model for housing regeneration in greyfield residential precincts*, AHURI Final Report No.171. Australian Housing and Urban Research Institute.

- Newton, P., 2010. Beyond Greenfield and Brownfield: The Challenge of Regenerating Australia's Greyfield Suburbs, *Built Environment* 36(1), 24.
- Nygaard, C. and Meen, G., 2013. The Distribution of London Residential Property Prices and the Role of Spatial Lock-in, *Urban Studies* 50 (12), 2535-2552.
- Pettit, C. Klosterman, R. Nino-Ruiz, M. Widjaja, I. Tomko, M. Sinnott, R. Stimson, R. 2013. The online What If? Planning support system, in S. Geertman and J. Stillwell (Eds) *Planning support systems for sustainable urban development*, 349-362, Springer, Berlin.
- Property Council of Australia. 2013. Glen Eira plans a sweet and sour future, *propertyoz*, 5 August, 1.
- SGS Economics and Planning (SGS)., 2011. *Housing Capacity Assessment: Method Report*, Prepared for Department of Planning and Community Development, State of Victoria.
- Swart, R. Raskin, P. Robinson, J. 2004. The problem of the future: sustainability science and scenario analysis, *Global Environmental Change, Part A: Human and Policy Dimensions*, 14(2), 137-146.
- Wegener, M. 1994. Operational urban models: state of the art, *Journal of the American Planning Association*, 60, 17-29.
- Woodcock, I., K. Dovey, et al., 2010. Modelling the compact city: capacities and visions for Melbourne, *Australian Planner* 47(2), 94-104.
- Woodcock, I., K. Dovey, et al., 2009. Compact City Visions for Melbourne. *State of Australian Cities Conference*. P. J. Maginn, R. Jones and F. Haslam-Mackenzie (eds.), Proceedings, Perth.

rmit.edu.au/research/urban
twitter.com/rmit_cur
facebook.com/rmit_cur

